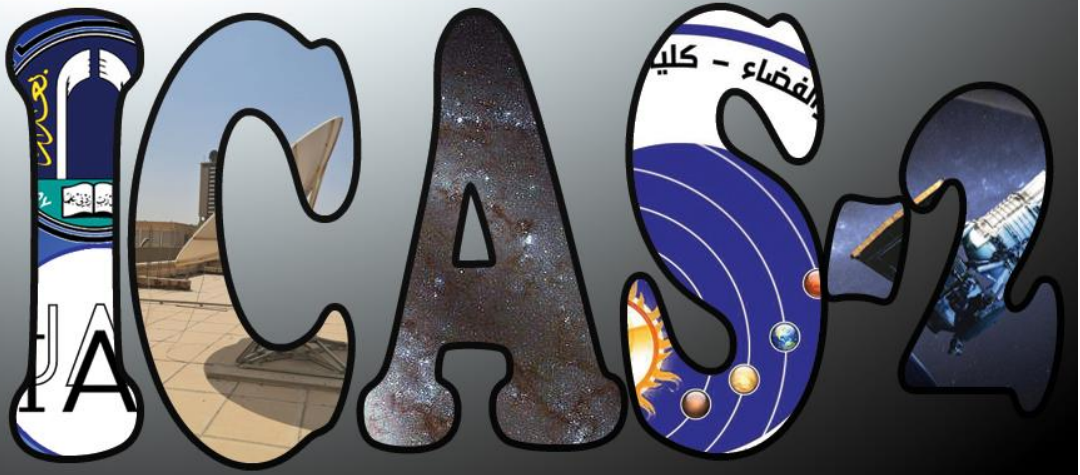
Proceedings of

The Second International Conference of Astronomy and Space ICAS-2, 2023



مقررات المؤتمر

Conference Proceedings

المؤتمر الدولي العلمي الثاني للفلك والفضاء, 2023

24 إلى 26 تشرين الأول أكتوبر 2023
قسم الفلك والفضاء – كلّية العلوم – جامعة بغداد

The Second International Scientific Conference of Astronomy and Space ICAS-2

24-26th October 2023
Department of Astronomy and Space
College of Science -University of Baghdad

نتقدم بالشكر الجزيل إلى الجهات الراعية للمؤتمر

جامعة بغداد

كلّية العلوم

محافظة بغداد

نبذة عن قسم الفلك والفضاء

- تأسس قسم الفلك والفضاء في كلّية العلوم بجامعة بغداد عام 1998.
- يقوم بتخريج طلبة الدراسات الأولية (البكالوريوس) والعليا (الماجستير والدكتوراه) في اختصاص علوم الفلك.
- القسم هو القسم الأكاديمي الوحيد من نوعه في العراق، الذي يهتم بدراسة وتخريج الطلبة والباحثين في علوم الفلك وتكنولوجيا الفضاء.
- خلال 1998-2023، تخرج المئات من طلبة الدراسات العليا والأولية من القسم، من المؤهلين للعمل في مختلف وزارات الدولة ومؤسساتها.
- القسم هو الممثل الرسمي الوحيد للعراق في الاتحاد الدولي للفلك منذ العام 2021.
- هذا هو المؤتمر العلمي الدولي الثاني لعلوم الفلك والفضاء الذي يقيمه القسم. المؤتمر الدولي الأول أقيم في العام 2001.
- شارك أساتذته في العديد من الفعاليات العلمية والعامة المختلفة، في جامعة بغداد وخارجها، في مؤسسات رسمية وغير رسمية، كالمدارس والثانويات الأهلية والمجتمع المدني وغيرها.
- أقيمت فيه خمسة معارض فلكية بين 2016-2022 والمئات من النشاطات كالمحاضرات والندوات وأمسيات الرصد، والدورات التدريبية وورش العمل.

للتواصل مع القسم:
Email: astro.info@sc.uobaghdad.edu.iq
www.sc.uobaghdad.edu.iq
التواصل مع المؤتمر:
Email: icas@sc.uobaghdad.edu.iq
www.icas.uobaghdad.edu.iq

About the Department of Astronomy and Space

- The Department of Astronomy and Space was established at the College of Science at the University of Baghdad in 1998.
- It graduates students of undergraduate studies (bachelor's) and postgraduate studies (master's and doctorate) in astronomy.
- The department is the only academic department of its kind in Iraq, which is concerned with the study and graduation of students and researchers in astronomy and space technology.
- During 1998-2023, hundreds of graduate and primary students graduated from the department, who are qualified to work in various state ministries and institutions.
- The department is the only official representative of Iraq in the International Astronomical Union IAU since 2021.
- This is the Second International Scientific Conference of Astronomy and Space held by the department. The first international conference was held in 2001.
- Our department's professors have participated in many different scientific and public events, at the University of Baghdad and abroad, in formal and informal institutions, such as private schools and secondary schools, NGO and others.
- Five astronomical exhibitions were held between 2016 and 2022 and hundreds of activities such as lectures, seminars, observation evenings, training courses and workshops.

To contact department:
Email: astro.info@sc.uobaghdad.edu.iq
www.sc.uobaghdad.edu.iq

Contact the conference:
Email: icas@sc.uobaghdad.edu.iq
www.icas.uobaghdad.edu.iq

حول المؤتمر العلمي الدولي الثاني لقسم الفلك والفضاء

يقيم قسم الفلك والفضاء في كلّية العلوم جامعة بغداد، المؤتمر الدولي العلمي الثاني للفلك والفضاء للعام 2023. نسعى من خلال إقامة هذا المؤتمر إلى تعزيز الجوانب البحثية المرتبطة بعلوم الفلك وتقنيات الفضاء، عن طريق استعراض أحدث البحوث العلمية الرصينة ذات العلاقة، والتي يقدمها باحثون من داخل العراق وخارجه.

نطمح أن يمثل هذا المؤتمر يمثل نقلة نوعية في البحث العلمي الخاص بتقنيات الفضاء والعلوم الفلكية، برفد المؤسسات البحثية المختلفة بأفكار ومكتشفات علمية حديثة، كما نرجو أن يمثل مؤتمرنا خطوة في الاتجاه الصحيح نحو تعزيز وتطوير العلوم الفلكية في العراق والعالم.

هذه هي النسخة الثانية من المؤتمر، إذ أقام القسم المؤتمر الدولي الأول للفلك والفضاء في العام 2001، وشهد نجاحا كبيرا بمشاركات متميزة من باحثين عراقيين وعرب وأجانب. طموحنا أن يستمر هذا المؤتمر بنسخ أخرى خلال السنوات القادمة، وهو تعزيز لسياسة جامعة بغداد وكلّية العلوم في جذب الانتباه الوطني والعالمي نحو النشاط البحثي المتميز لمؤسساتنا الأكاديمية العريقة.

About ICAS-2

The Department of Astronomy and Space at the College of Science, University of Baghdad, holds the Second International Scientific Conference on Astronomy and Space ICAS-2, 2023. Through the establishment of this conference, we seek to enhance the research aspects related to astronomy and space technologies, by reviewing the latest relevant scientific research, presented by researchers from inside and outside Iraq.

We hope that this conference represents a qualitative leap in scientific research on space technologies and astronomical sciences, by providing various research institutions with modern scientific ideas and discoveries, and we hope that our conference will represent a step in the right direction towards promoting and developing astronomical sciences in Iraq and the world.

This is the second edition of the conference, as the department held the first international conference on astronomy and space in 2001, and witnessed great success with distinguished participation from Iraqi, Arab and foreign researchers. Our ambition is that this conference will continue in other editions in the coming years, and it is a reinforcement of the policy of the University of Baghdad and the College of Science in attracting national and international attention towards the distinguished research activity of our prestigious academic institutions.

اللجنة الاستشارية في المؤتمر

تشرفنا بمشاركة مميزة من أشهر الأساتذة في الاختصاص العلمي كأعضاء في اللجنة الاستشارية للمؤتمر وهم كل من السيدات والسادة المحترمين:

1. أ. د. حميد مجول النعيمي (رئيس اللجنة الاستشارية)	مدير جامعة الشارقة، الامارات العربية المتحدة
2. أ.د. مجدي ياسين أمين (عضو اللجنة الاستشارية)	رئيس قسم الفلك في كلّية العلوم بجامعة القاهرة، جمهورية مصر العربية
3. أ.د. جاد محمد القاضي (عضو اللجنة الاستشارية)	رئيس المعهد القومي للبحوث الفلكية والجيوفيزيقية بحلوان، جمهورية مصر العربية
4. أ.د. هادية حسن سليم (عضو اللجنة الاستشارية)	المعهد القومي للبحوث الفلكية والجيوفيزيقية بحلوان، جمهورية مصر العربية
5. أ.د. حنا أنطون صابات (عضو اللجنة الاستشارية)	المركز الإقليمي لعلوم الفلك والفضاء ف غرب آسيا بعمّان، المملكة الأردنية الهاشمية
6. أ.د.زكي عبدالرحمن عبد الله (عضو اللجنة الاستشارية)	مدينة الملك عبد العزيز آل سعود للعلوم والتقنية بالرياض، المملكة العربية السعودية
7. أ.د. عبد الرحمن المغربي (عضو اللجنة الاستشارية)	مدينة الملك عبد العزيز آل سعود للعلوم والتقنية بالرياض، المملكة العربية السعودية
8. أ.د. كمال محمد عبود (عضو اللجنة الاستشارية)	قسم الفلك والفضاء في كلّية العلوم بجامعة بغداد، العراق

اللجنة العلمية في المؤتمر

اسماء السيدات والسادة المحترمون أعضاء اللجنة العلمية للمؤتمر من قسم الفلك والفضاء في كلّية العلوم جامعة بغداد:

1.	أ. د. بشرى قاسم نقيب	رئيسة اللجنة العلمية
2.	أ.د. عبد الرحمن حسين صالح	عضو اللجنة العلمية
3.	أ.د. سلمان زيدان خلف	عضو اللجنة العلمية
4.	أ.د. خالد عبد الكريم هادي	عضو اللجنة العلمية
5.	أ.د. نجاة محمد رشيد رؤوف	عضو اللجنة العلمية
6.	أ.م.د.عبد الله كامل أحمد	عضو اللجنة العلمية
7	أ.م. د. وليد إبراهيم ياسين	عضو اللجنة العلمية

اللجنة التحضيرية للمؤتمر

اسماء السيدات والسادة المحترمون أعضاء اللجنة التحضيرية للمؤتمر من قسم الفلك والفضاء في كلّية العلوم جامعة بغداد:

1.	أ.م.د. عبد الله كامل أحمد	رئيس اللجنة التحضيرية
2.	أ.م.د.أحمد عبدالرزاق سلمان	عضو اللجنة التحضيرية
3.	أم..د. رائد نوفي حسان	عضو اللجنة التحضيرية
4.	أ.م.د. محمد ناجي عبد الحسين	عضو اللجنة التحضيرية
5.	أ.م.د. أحمد حسن عبد الله	عضو اللجنة التحضيرية
6.	أ.م.د.عمر اكرم عبد الوهاب	عضو اللجنة التحضيرية
7.	م.د. فؤاد محمود عبد الله	عضو اللجنة التحضيرية
8.	م.د. أمال عبد الحسين وزير	عضو اللجنة التحضيرية
9.	م.د. أنس سلمان طه	عضو اللجنة التحضيرية
10.	م.د. هدى شاكر علي	عضو اللجنة التحضيرية
11.	م.د. عدي عطيوي جلود	عضو اللجنة التحضيرية
12.	م. د. رشا هاشم ابراهيم	عضو اللجنة التحضيرية
13.	م. د. لانه طالب علي	عضو اللجنة التحضيرية
14.	م. أرشد علي كاظم	عضو اللجنة التحضيرية
15.	م. حسنين حسن علي	عضو اللجنة التحضيرية
16.	م. رفاه رشيد اسماعيل	عضو اللجنة التحضيرية
17.	م.م حيدر رضا حسين	عضو اللجنة التحضيرية

منهاج المؤتمر: اليوم الأول الثلاثاء 24-10-2023

9.30 -11.30 جلسة الافتتاح (قاعة الادريسي)	9.30-9.35	آيات من القران الكريم وقفة قراءة الفاتحة على ارواح علماء وشهداء العراق
	9:35-9:45	كلمة السيد رئيس جامعة بغداد
	9:45-9:55	كلمة السيد عميد كلية العلوم
	9.55-10.25	كلمة الاستاذ الدكتور حميد مجول النعيمي (مدير جامعة الشارقة ورئيس اللجنة الاستشارية)
	10:25-11:00	محاضرة أ.م.د. عبد الله كامل احمد (رئيس قسم الفلك والفضاء ورئيس اللجنة التحضيرية)
11:00-11:30		استراحة

قاعة الادريسي			قاعة قسم الفلك والفضاء		
11.30 - 12.30	الجلسة الأولى		11.30 - 12.30	الجلسة الاولى	
	ICAS2_6	11.30-11.50		ICAS2_35	11.30-11.50
	ICAS2_22	11.50-12.10		ICAS2_38	11.50-12.10
	ICAS2_59	12.10-12.30		ICAS2_41	12.10-12.30
12.30 - 1.30	الجلسة الثانية		12.30 - 1.30	الجلسة الثانية	
	ICAS2_13	12.30-12.50		ICAS2_24	12.30-12.50
	ICAS2_28	12.50-1.10		ICAS2_17	12.50-1.10
	ICAS2_21	1.10-1.30		ICAS2_44	1.10-1.30

منهاج المؤتمر اليوم الثانى: الأربعاء 25-10-2023

قاعة الادريسي			قاعة قسم الفلك والفضاء		
الجلسة الاولى		9:00 - 10:40	الجلسة الاولى		9:00 - 10:40
ICAS2_2	9.00-9.20		ICAS2_27	9.00-9.20	
ICAS2_5	9.20-9.40		ICAS2_32	9.20-9.40	
ICAS2_3	9.40-10.00		ICAS2_45	9.40-10.00	
ICAS2_23	10.00-10.20		ICAS2_43	10.00-10.20	
ICAS2_56	10:20-10:40		ICAS2_42	10:20-10:40	
الجلسة الثانية		10:40 - 12:00	الجلسة الثانية		10:40 - 12:00
ICAS2_20	10:40-11:00		ICAS2_16	10:40-11:00	
ICAS2_1	11:00-11:20		ICAS2_12	11:00-11:20	
ICAS2_25	11:20-11:40		ICAS2_26	11:20-11:40	
ICAS2_15	11:40-12:00		ICAS2_10	11:40-12:00	
12:00-12:20			استراحة		
الجلسة الثالثة		12:20 - 1:20	الجلسة الثالثة		12:20 - 1:20
ICAS2_40	12:20-12:40		ICAS2_58	12:20-12:40	
ICAS2_7	12:40-1:00		ICAS2_11	12:40-1:00	
ICAS2_39	1:00-1:20		ICAS2_51	1:00-1:20	

منهاج المؤتمر اليوم الثالث الخميس 26-10-2023

قاعة الادريسي			قاعة قسم الفلك والفضاء		
الجلسة الاولى		9:00 - 10:20	الجلسة الاولى		9:00 - 10:20
ICAS2_18	9.00-9.20		ICAS2_19	9.00-9.20	
ICAS2_29	9.20-9.40		ICAS2_49	9.20-9.40	
ICAS2_9	9.40-10.00		ICAS2_37	9.40-10.00	
ICAS2_14	10:00-10:20		ICAS2_33	10:00-10:20	
10:30-12:00			**حفل الاختتام**		

لجان جلسات المؤتمر

اليوم	الجلسة	القاعة	
		قاعة الادريسي	قاعة قسم الفلك والفضاء
الأول	الاولى	رئيس الجلسة: أ.د. عبد الرحمن حسين مقرر الجلسة: أ.م.د. حارث سعد	رئيس الجلسة: أ.د. كمال محمد مقرر الجلسة: م.د. ياسر عز الدين
	الثانية	رئيس الجلسة:أ.د. خالد عبد الكريم مقرر الجلسة: م.د. فؤاد محمود	رئيس الجلسة: أ.د.نجاة محمد رشيد مقرر الجلسة: م.د. أنس سلمان
الثاني	الاولى	رئيس الجلسة: أ.م.د.احمد كامل مقرر الجلسة: م.د. ياسر جاسب	رئيس الجلسة:أ.م.د. احمد عبد الرزاق مقرر الجلسة: أ.م.د. احمد حسن مقرر الجلسة: م.د.دريد عبدالسلام
	الثانية	رئيس الجلسة: أ.د.بشرى قاسم مقرر الجلسة: م.د. رعد فالح	رئيس الجلسة:أ.د. سلمان زيدان مقرر الجلسة: أ.م.د.سنان حسن
	الثالثة	رئيس الجلسة: أ.م.د. وليد ياسين مقرر الجلسة: م.د. امال عبد الحسين	رئيس الجلسة: أ.م.د. محمد ناجي مقرر الجلسة:م.د. هدى شاكر
الثالث	الاولى	رئيس الجلسة: أ.م.د. رائد نوفي مقرر الجلسة: م.د. عدي عطيوي	رئيس الجلسة: أ.د. الاء فاضل مقرر الجلسة: م.د. عماد كسار

ICAS-1

Atmospheric Turbulence Parameters Deduced from Vertical Profile of Cn2

Raaid Nawfee Hassan
Department of Astronomy and Space, College of sciences, Univ. of Baghdad,Baghdad, Iraq. Email:raaid.hassan@sc.uobaghdad.edu.iq

Abstract
The proposed framework can capture realistic spatiotemporal variations in atmospheric turbulence parameters based on local meteorological conditions, such as Fried's parameter r_0, isoplanatic angles θ_0, seeing ε, scintillation rate σ_I^2, and the wavefront coherence time τ_0. Thoseparameters have been deduced from the refractive index structure parameter C_n^2. Lines were drawn at latitudes 34.26° and 28.31°, respectively, in the middle and south of the Iraqi border. These parameters are used to test the best place for site selection. The results showed, according to the criteria of air turbulence, that the middle of Iraq was better than the southern location for observation.

Keywords: Refractive structure constant, coherence time, Fried's parameter, Optical turbulence, Applied optics.

ICAS-2

Spatially Resolved Characteristic of the Merging Galaxy VV114 as Seen by ALMA

Jazeel H. Azeez
Department of Physics, College of Science, Al-Nahrain University, Baghdad, Iraq. Email jazeelhussein@yahoo.com

Abstract

Merging galaxies provide us with an excellent laboratory for investigating a number of physical properties related to the merging processes. In this manuscript, we report a high-resolution ^{12}CO (J= 1 – 0) data of the molecular gas in the merging galaxy VV114 from Atacama Large Millimetre/Sub-millimetre Array (ALMA) for the purpose of studying some of the physical cteristicschara at the sub-kpc scale. Infrared (IR) data from Spitzer Space Telescope have been used to determine the star formation rate (SFR) and are compared with the properties of the molecular gas. The molecular gas has been resolved into 12 regions with a scale of (500 – 600) pc in the CO(1 – 0) integrated intensity and velocity dispersion map. Our finding shows a low value for the index of the star formation law, this may be due to a strong turbulent pressure that could restrict star-formation activity in galaxies at hundreds-parsec scales, causing the KS law power index to reduce. A significant positive correlation between CO(1 – 0) luminosity surface density and velocity dispersion and a low positive correlation between star formation rate surface density and velocity dispersion was founded for this galaxy.

Keywords: Galaxies, Star formation, Velocity dispersion, ALMA, VV114.

ICAS-3

Spatial and Temporal Analysis of Severe Dust Storm in Iraq on May 2022

Rafah Rasheed Ismail[1], Bushra Qassim Al-Abudi[1], Saadiyah H. Halos[2]
[1]Department of Astronomy and space, College of Science, University of Baghdad, Baghdad, Iraq. Email rafah.ismail@sc.uobaghdad.edu.iq
[2]Atmosphere and Space Sciences Centre, Directorate of Space Technology & Communication, Ministry of Sciences and Technology, Baghdad, Iraq

Abstract
Dust storms are regarded a common ecological occurrence in many world‘s country, mainly in dry and semi-dry parts. Dust Storms have a tremendous influence on human healthiness, environment, climate, and numerous social aspects.
In this paper, spatial and temporal analysis, metrological triggers, trajectory, dust exporting areas of severe dust storm accrued in Iraq on 16 May 2022, was investigated using MODIS,Meteosat, LANDSAT satellite images and HYSPLIT model. The results revealed that HYSPLIT model trajectory of dust storm was agreement with MODIS satellite visuals. The main Dust storm sources and their areas are identified; First source is from the common border region between both the Syria (Rif-Dimasshq) and Jordan (north of Al-Ruwaished) with area about (775) Km^2. The second is from northwestern regions of Iraq, specifically north of Anbar and south of Nineveh, with area about (905) Km^2.

Keywords: Dust Storm, MODIS, HYSPLIT, LANDSAT, Iraq.

ICAS-5

Study geometrical model of the protoplanetary disk around Brown Dwarf CFHT-BD-Tau 4

Anas S. Taha[1], Bashar Alkotbe[2], Arshed Ali [1]
[1] Astronomy and Space Department, College of Science, University of Baghdad, Baghdad, Iraq. Email: anas.s@sc.uobaghdad.edu.iq.
[2] Physics Department, College of Science, University of Kerbala, Kerbala, Iraq

Abstract:
The circumstellar disk around young stars and Brown Dwarf play an essential role in the formation and evaluation of the planet formation. Our main work in this paper is investigating the geometrical shape model for the protoplanetary disk around one of the Brown Dwarfs. The photometric measurements for the brown dwarf CFHT-BD-Tau 4 have been extracted from Vizier archive. We have used a numerical simulation to build a model of the spectral energy distribution of our target CFHT-BD-Tau 4. The model of the spectral energy distribution have been fitted with observational data for the brown dwarf CFHT-BD-Tau 4. A transitional disk has been assumed around CFHT-BD-Tau 4, We have obtained physical properties of the two disks and size of the gap between them from fitting the SED. The gap existed in the protoplanetary disk proves that a planet formation process happened around Brown Dwarf.

Keywords: Photometry, Brown Dwraf, Spectral Energy Distribution (SED), protoplanetary disk, Star, CFHT-BD-Tau 4.

Homogeneity of Iraqi climatological parameters and its Link with geopotential height 850hPa

Jasim Al-Khalidi[1], Dher Bakr[1], Rudainah Sedeeq[1]
1Department of physics, Faculty of Sciences, University of Diyala.
Email: jasimkhalel77@yahoo.com

Abstract
The homogeneity of Iraqi precipitation and temperature is emphasized. The study investigates the link between Iraqi precipitation (mm) and temperature (^{0}C) with the geopotential height (Z850hPa) fields. The available observation data of these climatological parameters from the Iraqi meteorological organization are utilized. Precipitation and temperature characteristics are analyzed.Regarding Iraqi precipitation, homogenous values with one mean over the time period are observed. In contrast, temperatures show a shifting trend over the study period, with an increasing trend after the year 1993 in most stations. Maximum precipitation values are recorded in the northern mountain region, while the minimum value is recognized in the southern part of Iraq. The temperature pattern shows a reverse characterization of the precipitation distribution.To investigate the relationship between Z850hPa and the two Iraqi climatological parameters, a correlation map is utilized. The analysis reveals that for precipitation, the main mechanism bringing cold air mass over the Iraqi region in winter is the cold air dropping from the polar regions. In spring, the air advection of wet air from the Mediterranean Sea and North Africa plays a crucial role in bringing precipitation to Iraq. Additionally, during summer and autumn, the air advection of hot air from India and eastern Africa through the Arabian Peninsula is associated with Iraqi temperature patterns.
Keywords: Iraq, precipitation, temperature, geopotential height 850hPa, correlation map.

Calculation of the components of stellar- gaseous kinematics and dynamics mass of elliptical and SO- type galaxies

Rabab Mozher J. [1], Al Najm Mohammed Naji[1]
[1]Department of Astronomy and Space, College of Science, University of Baghdad, Baghdad, Iraq. Email: rabab.mozher1107d@sc.uobaghdad.edu.iq

Abstract
The goal of this study is to demonstrate the estimates of the features of stellar-gaseous kinematics and dynamics mass using scaling coefficient relationships (such as the Faber–Jackson relation (FJR)) of a sample of elliptical and SO-type galaxies. We selected a sample of elliptical and SO-type galaxies (80 elliptical and 97 Lenticular type) from previous literature work and used the statistical package for Social Sciences "SPSS" and Matrix Laboratory (MATLAB) program to find out the associations of multiple factors under investigation such as main kinematic properties of the gaseous-stellar (effective radius Re, surface brightness density at effective radius Σeff, stellar mass M*, gas mass Mgas, dynamic and baryonic masses) in the elliptical and SO galaxies. We concluded that the experimental convergences between (logMbar (B) - log Mdyn, Log Mbar (B) - Log MBH) have a very strong correlation ~1, and the slope appears to be more linearly ~1 in both types of galaxies. This paper also noted that the empirical convergences between log Σeff (B) and log Mdyn have a strong high regression relationship of ~1. The slope appears to be approximately linear ~1 in the lenticular galaxies, but there is no relationship between Σeff (B) and log Mdyn in the elliptical galaxies. Because elliptical galaxies are so affected by dynamic rotation, it is interestingly believed that they are objects under disruption and outside of dynamics.
Keywords: galaxies: ellipticals and lenticulars; kinematics and dynamics – galaxies; structure – evolution galaxies.

Stellar Thermonuclear Reaction Rates of Proton Radiative Capture by Closed Shell Light Isotopes

Fatimah Fadhil Abd Ali, and Ahmed Abdul-Razzaq Selman
Department of Astronomy and Space, College of Science, University of Baghdad

Abstract

Light isotopes have significance in thermonuclear reactions within stellar cores especially in the CNO cycle. Especially closed shell nuclei have gained special attention in this cycle due to their special characteristics. In this research, radiative proton capture on such nuclei, namely $^{12}C(p, \gamma)\ ^{13}N$ and $^{14}N(p, \gamma)\ ^{15}O$ have been calculated by means of reaction rate for the non-resonant portion of the spectrum and throughout a temperature range of 0.006 -10 GK, as well as the astrophysical S- factor S(E) at low energies. The calculations have been made using a writtenMatlab code. The findings were compared with conventional reactions before and after statistical analyses, and the results were acceptable when compared to earlier compilations and reference libraries. It was concluded that the higher binding energy of these isotopes make the reaction less probable thus enabling other competitive processes to develop, which enhances the probability of other competitive proton reactions in the CNO cycle.

Keywords: S- factor, Radiative capture reactions, sommerfeld parameter , nuclear reactions , Gamow energy, Nucleosynthesis.

Assessment of Transitional Orbits from a High Eccentricity LEO to a Circumlunar Orbit

Marwah Issa Abood ALnidawi[1] Abdul-Rahman H. Saleh
[1'2] Departments of Space and Astronomy, College of Science, University of Baghdad, Baghdad, Iraq. Email [*1,] memaissa6@gmail.com

Abstract:
This study presents an evaluation of the achievability and execution of transitional orbits for spacecraft transitioning from a high eccentricity Low Earth Orbit (LEO) to a circumlunar orbit, with the point of distinguishing the foremost proficient and ideal trajectory whereas considering variables such as velocity and required fuel. Transitional orbits have a role in space exploration, and optimizing their characteristics can enormously advantage mission planning and spacecraft design. A numerical simulation model was developed to attain this objective, A gravity perturbations effect is included in the calculation of the transition. The model utilized progressed numerical integration strategies for exact trajectory analysis.
Three cases were examined to investigate the impacts of varying eccentricity and the argument of perigee on the ideal transition, In the first case, eccentricity values of [0.001, 0.01, 0.1] were inspected, whereas the argument of perigee was fixed at 80 degrees. Within the second case, the argument of perigee values of [80, 170, 260] was considered, with the eccentricity fixed at 0.1. The third case included at the same time varying the eccentricity and argument of perigee values. The results appeared that the three cases agreed the most favorable transition occurred when eccentricity was set to 0.1 and the argument of perigee was set to 80 degrees. This yielded a velocity increased 1.646420 km/s.
Keywords: Transitional Orbits; Eccentricity; argument of perigee; LEO; lunar orbit

The Impact of Partial Solar Eclipse on the Observation of Neutral Hydrogen Emission Line

Uday E. Jallod[1], Hareth S. Mahdi [1], Lana T. Ali [1], and Kamal M. Abood[1]
[1]Department of Astronomy and Space, College of Science, University of Baghdad, Baghdad, Iraq. Email: uday.jallod@sc.uobaghdad.edu.iq

Abstract
This research aims to investigate the impact of partial solar eclipse on the strength of neutral hydrogen from the sun. The partial solar eclipse that occurred on the 15th of October last year was monitored using Baghdad University Radio Telescope (BURT). The observations were carried out from 11:30 AM to 3:36 PM, in order to record the radio signal from the sun before, during and after the partial solar eclipse. At the moment of maximum eclipse, 46 % of the sun's disk was covered by the moon. To achieve the goal of this work, the radio wave intensity from the sun was observed and recorded and the solar flux density was calculated at different times before, during and after the event. The results of this work showed that the power spectrum as well as the solar flux decrease with the progress of the partial solar eclipse until the maximum eclipse occurred. At that moment, the minimum values of antenna temperature and solar flux density were recorded and found to be ~ 80 K, and 7×10^4Jy, respectively. After that, the area of the sun's disk covered by the moon started to decrease again and hence the solar flux began to increase again. In conclusion, the partial solar eclipse affects the strength of neutral hydrogen from the sun. This is due to the fact that the neutral hydrogen from the sun was blocked by the moon during the solar eclipse.

Keywords: Solar eclipse, radio sun observation, antenna temperature, flux density.

ICAS-12

Resonance Strengths of Alpha Capture on Mg Isotopes in Stellar Shells

Noor Alhuda Kamel Hussein, and Ahmed Abdul-Razzaq Selman
Department of Astronomy and Space, College of Science, University of Baghdad

Abstract

Alpha particle reactions have gained significant interest in stellar reactions since it is responsible of many important signatures of stars evolution, especially for stars more than 4 solar masses. In this research we studied alpha particle capture with resonance strengths at thermonuclear energies for Mg isotopes, namely $^{25}Mg(\alpha,n)^{28}Si$ and $^{26}Mg(\alpha,n)^{29}Si$ reactions. Results have been calculated using Matlab code, and when compared with earlier ones, it was shown that the non-resonant results agreed up to temperature 3 GK for ^{25}Mg, and deviate significantly for ^{26}Mg. However, introducing the resonance highly modified the results for both isotopes. The effect was explained due to the lower excited states, where especially for ^{26}Mg reactions these levels highly contribute in the exit channel thus affecting the overall product of the reactants.

Keywords: Nuclear reaction, resonance, Thermonuclear energies, Capture reaction , AGB stars .

ICAS-13

Estimation of some climatological parameters by WEKA software for selective regions in Iraq

Dher I. Bakr[1] ,Jasim Al-Khalidi[1] , Abas Wisam Mahdi Abas[2] and Layla A. ALHak[1]

1 Department of Physics, College of Sciences, University of Diyala, Diyala, Iraq.
2Presidency of Diyala University, University of Diyala, Diyala, Iraq. Email: dharentisar78@gmail.com

Abstract

An Estimation is a direct summation that can produce new data from past measurements. In this study, we confirm the possibility of using the (WEKA) program in estimating the monthly values of some climatological parameters and investigate the influence of the time series' length parameters on the accuracy of estimation for selected regions of Iraq. Satellite data were used, which represent the monthly values for each of the minimum and maximum temperature, wind velocity, and relative humidity for the 1981 – 2021 time period, the absolute error rate (MAE), and the square root of the error rate (RMSE) with the correlation (R^2) are also identified to test the confidence of the prediction. By using (WEKA) software, which depends only on the time series of the parameters in the estimation, 12 months were estimated for the mentioned parameters. The estimated values by WEKA were close to the satellite data, thus we can depend on the software as a good source of meteorological data. Also, the study indicates that the time series' length has a strong effect on the accuracy of the estimation, as the increase in the time series of weather parameters results in an increase in the estimate's accuracy, and this increase is fluctuating among parameters and varies from one region to another.

Keywords: Estimation, temperature, WEKA, Mean Absolute Error

Investigating the Annual Cross-Correlation Type between HPF, OWF and BUF Parameters Over Middle East Region

Aula A. Ezzat[2]*, Khalid A. Hadi[1]

[1]Department of Astronomy and Space, College of Science, University of Baghdad, Baghdad, Iraq.[2]Ministry of Science and Technology, Directorate of Space technology and Communication, Baghdad, Iraq. Email Aula1988@yahoo.com

Abstract

The goal of this work is to investigate the annual cross-correlation type between three different ionospheric parameters; these are Optimum Working Frequency (OWF), Highest Probable Frequency (HPF), and Best Usable Frequency (BUF). Annual predicted dataset of the studied parameters was generated using VOCAP and ASASPS models as a function of monthly Sunspot Numbers (SSN) during the minimum and maximum years of solar cycle 24, 2009 and 2014 respectively. The investigation was made for various transmitter/receiver station locations distributed over Middle East region, in this study thirty-two different locations were adopted depending on the geodesic parameters which were calculated for different path lengths (500, 1000, 1500, and 2000) Km and bearings (N, NE, E, SE, S, SW, W, NW) using a Matlab program that was designed and implemented for this purpose. In order to get the best cross-correlation between the tested parameters, various correlation methods were employed. The best cross-correlation method that provide a better representation of the correlation between the tested parameters was set as a third-order polynomial equation. The annual values of the HPF, OWF, and BUF parameters were predicted using the proposed mathematical correlation equations. These equations were validated by comparing their

results with the observed datasets for the studied years. Several statistical methods were used to validate the predicted and presented data, all of which gave good results for all test cases. Also, contour plot diagrams were adopted to illustrate the annual distribution (behavior) of the tested ionospheric parameters for all geodetic factors for the minimum and maximum years of SC 24.

Keywords:HF Communication, Ionospheric Parameters, HPF, OWF BUF, Annual cross section

ICAS-15

Recent Variability, Trends and Interrelationship in Air Temperature and Outgoing Longwave Radiation Over Iraq

Marwa. H. Al-Bayati[1*], Jasim M. Rajab[1], Ibtihaj S. Abdulfattah[2, 3], Hazim G. Daway[4], and Hwee San Lim[5]

[1]Department of Atmospheric Sciences, College of Science, Mustansiriyah University, Baghdad, Iraq.Email: marwa-habib@uomustansiriyah.edu.iq

[2]Dept. de Physique, Faculte´ des Sciences de Sfax (FSS), B.P. 802-3018 Sfax, Tunisia.

[3] Mustansiriyah University Presidency, Division of Human resources, Baghdad, Iraq.

[4] Department of physics, College of Science, Mustansiriyah University, Baghdad, Iraq.

[5]School of Physics, UniversitiSains Malaysia, 11800 Penang, Malaysia.

Abstract

The outgoing longwave radiation (OLR) is a fundamental and important parameter of the Earth's energy balance for many studies in the atmospheric science. The aim of this study to investigate the OLR and air surface temperature (AST) time series and trends distributions over five stations in Iraq, and the strength of relationship between these two parameters. The monthly AST and OLR data acquired from Atmospheric Infrared Sounder (AIRS) instrument lunched on Aqua platform for two decades. The correlation results displayed a strong positive and direct relationship between AST and OLR from September to June with high correlation coefficient (R) ranged between 0.924 and 0.956, except for July and August was moderate (0.713 and 0.783). The monthly time series for both AST and OLR showed similar changes and fluctuated, minimum (decreases, December and January) and maximum (increases, July and August) in trend, and the mean and standard deviation of the monthly AST

was (302.8 ± 3.77 Kº) and for OLR was (300.7 ± 12.45 Wm-2) during study period. The average monthly of AST and OLR variances among the seasons over five considered selected stations; Baghdad, Mosul, Basra, Kirkuk, Rutba. For both parameters, the lowest values in winter (northern region), highest in summer (southern region for AST and western region for OLR), moderate to slightly high in spring and autumn. The AST results appeared positive trends in their annual AST series over all stations. The OLR results also appeared positive trends in all station during study period. The relationship between the AST and OLR results plainly evident a high correlation coefficient (R) ranged between 0.713 and 0.95 for all months of the year from January to December. The results indicate the efficient use of AIRS data features and linear regression analysis to examine the relationship and variations of the atmosphere AST and OLR over different regions.

Keywords: Longwave, AIRS, Air surface temperature, Linear regression, Trend.

Estimation of the Physical Trace of Global Luminosity Emission at Multiwavelength and Star Formation Rates of Luminous Infrared Galaxies Using Extragalactic Distance Scale Techniques

Farah Z. Sh[*] and Al Najm Mohammed Naji[*]
[*]Department of Astronomy and Space, College of Science, University of Baghdad, Baghdad, Iraq.E-mail: farahzeyad9997@gmail.com

Abstract
This paper aims to study the rate of star formation (SFR) in luminous infrared galaxies at different wavelengths using distance measurement techniques (luminosity distance, modulus distance) and to know which methods are the most accurate in measuring the rate of star formation, as we present through this research the results of the statistical analysis (Descriptive statistics) for a sample of luminous infrared galaxies, where the data used in this research were collected from NASA Extragalactic Database (NED),and HYPERLEDA. This data was used to calculate the star formation rate and indicate the accuracy of the distance methods used(dl,dm) and the two methods were tested on Hα, OII, FIR, Radio continuum at 1.4 GHz, FUV, NUV, and total (FUV + FIR), and the results showed that the dl measurement method is the most accuracy in calculating (SFR) as it depends on the redshift and the relationship between them is direct, as for the other distance method (dm) it depends on absolute blue magnitude (M_B),it was somewhat less accurate, but the two methods are useful for the calculation.

Keywords: Luminous infrared galaxies; star formation rate; luminosity distance, modulus distance

Determining the rotation period of the L3.5 dwarf 2MASS J00361617+18211 via photometric observation

S. Dulaimi[1,2], R. P. Boyle[3], A. Golden[2,4,5], R. F. Butler[2,4]

[1] Department of Physics, College of Science, Al-Nahrain University, Jadriya, Baghdad, Iraq. E-mail: salam.dulaimi@nahrainuniv.edu.iq

[2] Centre for Astronomy, University of Galway, University Road, Galway, Ireland

[3] Vatican Observatory Research Group, Steward Observatory, University of Arizona, Tucson, AZ 85721, USA

[4] School of Natural Sciences, University of Galway, University Road, Galway, Ireland

[5]Armagh Observatory and Planetarium, College Hill, Armagh, BT61 9DB, Co. Armagh, Northern Ireland

Abstract

We report photometric observations of the radio-detected the L3.5 dwarf 2MASS J00361617+18211 (hereafter 2M J0036), obtained with the Galway UltraFast Imager (GUFI) on the 1.8m Vatican Advanced Technology Telescope (VATT) at Mt. Graham International Observatory, Arizona. In total ~ 14.5 hours of observations were obtained. 2M J0036 was shown to exhibit modulated emission with a period of ~ 3.1 hours. When combined with rotational velocity data obtained from previous work, our newly discovered rotation period gives an inclination angle of ~ 65.3 degrees for the rotation axis of 2M J0036 relative to our line of sight. Our findings for 2M J0036 suggest a probable relationship between the sources of optical and radio periodic variability. This relationship suggests that the optical and radio periodic behavior may be connected to magnetic events (e.g., star spots or aurorae). The reasons behind this are unclear, as is whether such a probable link is causative in nature.

Keywords: aurorae – star spots, – inclination angle, – optical, – radio, – rotation, – variability.

The Effect of Thermal Inversion with some Pollutants on Human Health

Firas S. Basheer[1],Samir K. Mohammed Al-Maamory[2], Ramiz M. Shubbar[3],Omar L. Khaleed[4],Faisal E. Hamadi[5]

[1]Department of Atmospheric Sciences, College of Sciences, Mustansiriyah University, Baghdad, Iraq

[2]Department of Atmospheric Sciences, College of Sciences, Mustansiriyah University, Baghdad, Iraq

[3]Ministry of Oil / Midland Refineries Company MRC/ Daura Refinery, Baghdad, Iraq

[4]Department of Atmospheric Sciences, College of Sciences, Mustansiriyah University, Baghdad, Iraq [3]Department of Atmospheric Sciences, College of Sciences, Mustansiriyah University, Baghdad, Iraq

Abstract

This study aims to find out the effect of thermal inversion on the concentration of some pollutants in the atmosphere in Baghdad city, during the period 2014,and to evaluate the relationship between thermal inversion and human health effects associated with air pollution. During this period, most of the temperature changes in the thermal inversion happen from November to March in Baghdad city. Air pollutant data download from the site Copernicus Atmosphere Monitoring Service (CAMS). The data showed that the levels of NO2, SO2, PM10 and PM2.5 decrease when cases of thermal inversion appear. Cases of diseases (acute respiratory diseases) associated with air pollution were compared, and were taken into consideration on the number of patients from the data of the Ministry of Health / Public Health Department / Institute of Allergy and Asthma ,that showed a significant increase in the average daily number of hospital visitors with an increase in cases of thermal inversion. The statistical

analysis showed that the correlation coefficient for the thermal inversion with the concentrations of air pollutants is very weak in this period for the changes in the thermal inversion was 0.04 and this relationship is positive.

Keywords: Human Health, Pollutant, Atmospheric Sciences, Thermal Inversion, Baghdad City.

The Impact of Geomagnetic Storms on the Ionospheric Critical Frequency in the Northern and Southern Mid-Latitude Hemisphere Regions

Salma H. Breber[2], Khalid A. Hadi[1]

[1]Department of Astronomy and Space, College of Science, University of Baghdad, Baghdad, Iraq.

[2]Ministry of Science and Technology, Directorate of Space Technology and Communication, Baghdad, Iraq.

Abstract

In this work, the impact of different geomagnetic storm events on the plasma-sphere layer (ionosphere layer) over the northern and southern hemisphere regions were investigated during solar cycle 23. To grasp the influence of geomagnetic storms on the behavior and variation of the critical frequency parameter of F2 ionospheric layer (foF2), Five geomagnetic storms (classified as great, severe, and strong, with Dst values <-100 nT) were chosen. Also, four stations located in different mid-latitude regions in the northern and southern hemispheres were designated, the two selected northern mid-latitude stations are: Millstone Hill (42.6 N, 288.50 W) and Rome (41.90 N, 12.50 E) whereas the other two selected southern mid-latitude stations are: Port Stanley (-51.60 S, 302.10 W) and Grahamstown (-33.30 S, 26.50 E). The findings of this study showed that during the two events (16 July,2000 and 24 August,2005), negative storms had a more impact on the values of f_oF2 at the northern hemisphere stations compared to those at the southern hemisphere, by noting a reduction in the values of the f_oF2 parameter. These outcomes are consistent with the examination results of the variation of $D(f_oF2)$, which revealed that the impact of negative storms on the f_oF2 parameter values was more dominant

in the northern stations (summer hemisphere). This was evident through the depletion in the electron density during the tested event times in all station except in Rome, where minor enhancements in foF2 were observed during the storm event on August 24, 2005. During equinox storm events occurring on March 31 and November 6, 2001, a noticeable negative impact of storms was observed across all stations. However, at Millstone Hill and Port Stanley stations, the results showed a slight positive storms impact during the event on October 21, 2001.

Keywords: Critical Frequency foF2, Geomagnetic storm, Dst- index, ionospheric Disturbance.

Aerial Images Enhanced Using Hybrid Algorithm Based on Dark Channel Prior and Adaptive Histogram Equalization

Nadia A. Khalaf[1] Noor J.Abrahim[2] Hana H. Kareem[3] Hazim G. Daway[4*]
[1,4] Department of physics, College of Science, Mustansiriyah University
[2]Ministry of Education, Directorate of Education, Baghdad
[3]Department of physics College of Education, Mustansiriyah University

Abstract
Aerial images are of great importance in many applications in remote sensing such as good vision, remote sensitivity, tracking, targets, etc. and improving these images is important in those applications. In this study, the orientation was made to improve the aerial images, depending on the Hybrid Algorithm used YCbCr color space, and include two algorithms Dark Channel Prior and Adaptive Histogram Equalisation, Where the lightness channel (Y) is improved using Adaptive Histogram Equalisation with histogram expansion, and color compounds (Cb and Cr), they are improved by using Dark Channel Prior algorithm. In this study, special data were used for the airspace of Iraq, which mostly suffers from dust due to climatic changes, as that image was improved and the quality of improvement was compared with several other methods. By analyzing the results, the proposed method obtained the best scale of quality, including an entropy value of (7.8211), an average gradient value of 14.2753, and a mean of standard division (39.6417).

Keywords: AHE, Aerial Images Enhancement, DCP, YCbCr

Calculating Calibration parameter(N_{RSK})

Ruaa Faraj Hanash[1a],Salman Zaidan Khalaf[1b]
[1] Department of Astronomy and Space, College of Science, Baghdad University, Baghdad, Iraq.E-mail: ruaafarag923@gmail.com

Abstract
This paper has been giving a dynamic analysis of the recently identified calibration parameter (NRKS) in the distance modulus equation for all celestial planets. The parameter NRKS has been applied here for seven different comets from the Kuiper-Belt region: (1P/Hally, C/2023 E1 (ATLAS), 23P/Brorsen-Metcalf, 20D/Westphal, 12P/Pons-Brooks, 13P/Olbers, and C/2022 P1 (NEOWISE)). This was accomplished by programming data from the Live Sky program during the previous years. It is determined that each comet has a distinctive NRKS that distinguishes it from other comets and that this parameter does not equal one. According to the data, seven comets' average NRKS is (2.53 for 1P/Hally, 2.561forC/2023 E1 (ATLAS), 2.57 for 23P/Brorsen-Metcalf, 3.07 for 20D/Westphal, 4.11 for 12P/Pons-Brooks, 4.12 for 13P/Olbers, and 17.22 for C/2022 P1 (NEOWISE).

Keywords: comets, apparent magnitude, geocentric, distance modulus

Simulation Temporal Fluctuations of $PM_{2.5}$ in Iraq by Using WRF/Chem Model

Ghadeer A. Redah[1], Zeinab Salah[2], Monim H. Al-Jiboori[1], Osama T. Al-Taai[1]*

[1]Department of Atmospheric Sciences, College of Science, Mustansiriyah University, Baghdad, Iraq
[2]Egyptian Meteorological Authority (EMA), Cairo, Egypt. Email osamaaltaai77@uomustansiriyah.edu.iq

Abstract

The impacts of particulate matter (PM) are globally important and health-critical parameters that should increase our knowledge of how aerosols affect the climate. In this paper, the simulation of $PM_{2.5}$ and its associated temporal variations were assessed for 2016 by using the WRF/chem model. The $PM_{2.5}$ concentration simulation in Iraq was utilizing a single domain, including a parent domain. Been used a model to analyze the fine particle feature by using regular hourly observations of $PM_{2.5}$ for both January and June. This approach involved calculating and analyzing $PM_{2.5}$concentrations. The results show that $PM_{2.5}$ demonstrated clear diurnal fluctuations, with the greatest hourly concentrations in Baghdad at 18:00 and 21:00, but the lowest concentrations often frequently at 00:00 and 3:00 in the winter. But with the highest hourly concentrations for summer at 06:00 and 03:00, the lowest concentrations often were frequently at 12:00 and 15:00.

Keywords: Particulate matter, Aerosol particles, $PM_{2.5}$ concentrations, Atmospheric Chemistry, WRF/Chem.

Comprehensive Analysis of the Pair Galaxy UGC 8335 Utilizing Multiple Filters

Haydar R. Al-baqir [1] Abdullah K. Ahmed [1]*
1Astronomy and Space Department, College of Science, University of Baghdad, Baghdad, Iraq. Email: abdullah.ahmed@sc.uobaghdad.edu.iq

Abstract. The two galaxies, UGC 8335 E and W, were investigated through the utilization of photometric and spectroscopic approaches, employing a variety of filters to gather the maximum amount of details feasible; the observed data was obtained by using the data releases (DR7 and DR17) provided by "The Sloan Digital Sky Survey (SDSS)." Subsequently, the data were fitted to ellipsoids through the utilization of "the Image Reduction and Analysis Facility (IRAF)" with the implementation of the STSDAS Library, precisely the ELLIPS task. Multiple characteristics of the two galaxies UGC 8335 E and W, have been scrutinized, including surface brightness, magnitudes, both vertically and horizontally changes, accumulated flux, the central axis position angles, the ellipticities, the isophotal shape parameters (B4), and star-forming rates (SFRs), together with their astronomical characteristics. The UGC 8335 galaxy pair has been confirmed as an interacting pair that exhibits significant indications of interaction and is undergoing a merging process. Furthermore, this combination is categorized as an intermediate galaxy pair and represents a physical system with enhanced stars formation rates.

Keywords: Interacting galaxies, merging galaxies, UGC 8335 E, UGC 8335 W, spectroscopy, and surface photometry, SDSS Filters.

Spatiotemporal variability and trend of ozone pollution from Satellite data (2003- 2021) in Iraq

Maha S. Hachim[1], Jasim M. Rajab[1], Ali M. Al-Salihi[1], and H. S. Lim[2]
1 Mustansiriyah University, College of Science, Department of Atmospheric Sciences, Baghdad, Iraq. Email: Maha.alsultan8@gmail.com
2 School of Physics, University Sains Malaysia. 11800 USM, Penang, Malaysia

Abstract
Ozone (O_3), naturally occurring at ground level and in Earth's upper atmosphere, dangerous pollutant hurts plants and lung tissue, and a major component of smog. The purpose of this study is to analyze the time series, trend and spatio-temporal changes of some observed parameters over Iraq using the Atmospheric Infrared Sounder (AIRS) during 2003- 2021. First, monthly Relative Humidity (RH), Outgoing Longwave Radiation (OLR), and O_3 time series derived from AIRS observations over six stations (Mosul, Sulaymaniyah, khanaqin, Rutba, Baghdad, and Basra) were analyzed, which similar changes and fluctuated in O_3 and OLR, minimum (decreases, January - December) and maximum (increases, May -August) in trend, and the mean and standard deviation of the monthly O_3 was (0.044±0.003 ppmv), and for OLR was (298± 22 Wm^{-2}) during study period. The RH shows highest values during December -February, and the lowest values from June – August, and the mean and standard deviation of RH was (28.66± 29.54 g/kg). Further O_3 trends revealed negative results in their annual series over all stations accept over khanaqin and Basra was positive trend. The O_3 concentrations were consistently connected with other meteorological variables (the O_3 has a negative correlation with the relative humidity and a beneficial correlation with temperature). The O_3

Spatiotemporal maps shows highest values during April and May in Mosul and Sulaymaniyah (0.0557 - 0.057), while in December, at middle and southern regions (Baghdad and Basra) was the lowest O_3 values (0.033) due to various meteorological processes and transport of pollutants at Iraq different regions. The results appeared the efficient use of AIRS data to analyze the variations and distributions of the atmosphere parameters over different regions.

Keywords: Ozone (O_3) pollution, ground level Ozone.

Best locations of fire stations in Baghdad Al-Rasafa by using modeling and GIS

Khalid H. Abbas AL-Aarajy[1], Sundus A.Abdullah Albakry[1]
[1]Department of Remote Sensing and Gis, College of Science, University of Baghdad, Baghdad, Iraq

Abstract
The study of sitology has a long historical background, and has recently attracted the attention of many researchers, and one of its most important branches is the locations of fire stations, where the location of fire stations is of great importance in major cities. One of the most important features of the appropriate location is to increase coverage and reduce access time. In this research, geographic information systems were used in order to choose the most appropriate sites on the Al-Rasafa side in the city of Baghdad/Iraq to facilitate access to the scene of the accident as soon as possible from the fire stations, and through the use of the geographical database of the city of Baghdad. GIS analysis was used to build the mathematical model that was adopted based on a number of criteria, including land uses, distance to commercial malls, government and educational institutions, hospitals, and distance from existing fire stations. A weight was given to each of these criteria using the Overlay Weighted tool from spatial analysis in geographic information systems to determine the most appropriate areas, then the road network was added to the criteria used, and then the selection was made on the areas close to the main roads, so the search results were to determine the best sites in Al-Karrada, Al-Sadr City and Al-Adhamiya

Keywords:Fire station, Spatial analysis, Remote Sensing, Euclidean distance,Conditional Weighted.

Laboratory Simulations of Plasma Generated Around Atmospheric Reentry Spacecraft

Nabaa Ahmed Abdulmuttaleb[1] and Waleed Ibrahim Yaseen[1]
[1]Department of Astronomy and Space-College of Science-University of Baghdad, Baghdad-Iraq. Email: waleedib1972cnc@gmail.com

Abstract
In this paper, plasma will be generated in a laboratory as a simulation of what happens to spacecraft when they enter the Atmospheric of Earth. Parameters of plasma generation have been determined in terms of pressure 0.1, 0.2, 0.3, 0.4, and 0.5 mbar, and generation energy200 W. The parameters of the generated plasma were calculated using the optical emission spectroscopy two intensity ratio method and the electron temperature, electron density, Debye length and plasma frequency was calculated. And compare the results with the actual results. Electron temperatures were obtained 2.26-1.71 eV and plasma frequency 8.09 $x10^{11}$-$6.7x10^{11}$ at 0.1-0.5 mbar pressure.

Keywords: laboratory as a simulation, plasma generation, optical emission spectroscopy, electron temperature, electron density, pressure and Altitude.

ICAS-27

Selecting Suitable Sites for Wind Energy harvesting in Iraq using GIS Techniques

WEDYAN G. NASSIF[1], DALILA ELHMAIDI[2], YASEEN K. Al-TIMIMI[3]
[1]Thermal Radiation Research Unit, College of Science,Tunis El Manar, 2092, Tunis, Tunisia. Email: wedyan.atmsc@uomustansiriyah.edu.iq
[2]Department of Atmospheric Science, College of Science, Mustansiriyah University, Baghdad, Iraq

Abstract
Wind energy is the use of wind turbines to extract energy from the kinetic energy of the wind to generate electricity. Wind energy is one of the most important renewable energy sources and has been widely used as an alternative to fossil fuels. It is an abundant renewable energy source, but its availability varies by location. The study aimed to identify the best locations for wind energy in Iraq to produce the energy needed for the future from renewable sources. A multi-criteria analysis was used to identify the most suitable locations for wind energy harvesting using geographic information systems (GIS).The most important data collected was climatic data and which includes a RASTER file of annual wind speed, temperatures, precipitation. soil moisture and NDVI (Normalized Difference Vegetation Index), covering the study area over the past forty years., In addition, the shape file was used for each (distance from power lines, roads, Cities, slopes, and land use), where an appropriate model based on geographic information systems was produced when a set of raster data sets were classified and overlayed by the weighted overlay tool

in Spatial Analysis Tools in ArcGIS 10.7.1. The results indicated that the best suitable sites for harvesting wind energy are located in the south-eastern regions of Iraq. It is characterized by wind activity with a speed of more than 6.2 m / s. On the other hand, these areas are close to power transmission lines, roads, and slopes are moderate. Therefore, these areas were considered suitable for wind farms. Additionally, locations with a high suitability index account for 5.3% of the total area, which is a significant indication of Iraq's potential for wind energy harvesting. 79.7% of the area has a moderate appropriateness score, 9.5% has a poor suitability index, and 5.4% has been deemed inappropriate.

Keywords: Wind Energy (WE), Multi-criteria, GIS, Iraq.

ICAS-28

Disturbances of Ionospheric Total Electron Content during Great and Severe Geomagnetic Storms above Iraq and Surrounding Areas

Najat M. R. Al-Ubaidi*; Raad Falih Hassan Foadi; Sura I. Gburi
University of Baghdad, College of Science, Department of Astronomy and Space
Email: najatmr10@yahoo.com

Abstract

Several studies have been done to understand the behavior of Total Electron Content (TEC) in the topside of the ionosphere during many types of geomagnetic storms. The aim of this research is to examine ionosphere disturbances using the TEC parameter during great and severe geomagnetic storms that continued for three days during the period (28-30 October 2003), above Iraq and the surrounding areas (latitude 27-39^{o}N; longitude 27-54^{o}E). TEC data was obtained fromtheDefense Meteorological Satellite Program (DMSP), To determine the type of geomagnetic storm, the Disturbance storm time (Dst) index was gathered for the selected days from the website Koyota, Japan WDC. According to data analysis and results, it is found that there is a good proportionality between Dst and TEC. In general there were significant enhancements in the values of TEC during storms; however, there was an anomaly when the storm continued for several hours during the day, there was a highly broad increase in TEC from sunrise to sunset. Moreover, when two types of storms occurred, two peaks or more appeared and they remained for one event, or even for more than one day. Comparisons between the observed TEC and the predicted values were made in order to check the validity of

the IRI-20 ionospheric model during the storm time above the mid-latitude selected areas; we found that there is a non-linear correlation between them with the 24 hours and three days, so the model is need some modification in future to be suitable for Iraq region during storm time.

Keywords: DST index; Geomagnetic storm; IRI model; Top-side ionosphere; Total electron content (TEC).

ICAS-29

Determine the characteristics of the turbulent transition orbit from LEO to GEO

***Omar A. Fadhil and* Abdul-Rahman H. Saleh**
* Department of Astronomy &space - college of Science - University of Baghdad, Baghdad, Iraq. Email:om19ar95@gmail.com

Abstract:
An orbital motion is the movement of any object around another object that shares its gravitational force. In this paper, the process of satellite transmission between different orbits was studied the characteristics of the turbulent transition orbit were studied to transfer a satellite from a low Earth orbit (LEO) (hp =200km, 400km, 600km,800km) and eccentricity (e=0.01,e=0.05,e= 0.1) and inclination (i=23.445) to geostationary orbit (hp=35790km).
Also, the transfer of the satellite was studied in two stages. The first stage from perigee of the first orbit, 200 km, to the apogee of the second orbit, 945 km. The eccentricity is 0.01.
As for the second stage, it is transition the satellite from perigee of the second orbit 800 km to the final orbit (geostationary orbit) 35790 km on the same eccentricity.
The aim of this paper is to calculate the best transition orbit in the presence of turbulence. Two types of turbulence were considered as atmospheric drag perturbation as well as J2 perturbation
A program was designed by us in the MATLAB program to calculate the speed required for the transition, the transition time, and the percentage change in mass, which represents the percentage of fuel that the satellite needs to transition from initial orbit to the final orbit, as well as the extent

of the effect of turbulence on the orbital elements of the transitional orbit. The perturbation equation was solved using the Rang Kota method. The results showed that ΔV required to transition is decreases with increases the altitude of the initial orbit, where the ΔV at an altitude of 800 km was the best result, reaching (2.24420719505645 km/sec) in the direct transition.

As for the transmission in two phases, it may need a higher energy for the transition, as the difference between it and the direct phase in delta v (0.011690697322555 km/sec).And that the effect of disturbance on the orbital elements of the transition orbit is small and decreases more with increasing the height of the satellite. Transmission time (0.44 days), less than half a day, so turbulence is very significant and this effect cannot be neglected.

Keywords: Atmospheric drag, J2 perturbation, Low earth orbit, Geo transfer orbit.

ICAS-32

The intense geomagnetic storm on March 24, 2023, associated with CMEs and solar flares

R. Umar[1*], S. N. A. Syed Zafar[1], N. H. Sabri[2], M. H. Jusoh[3], A. Yoshikawa[4], S. Abe[4], T. Uozumi[4]

[1]East Coast Environmental Research Institute, Universiti Sultan Zainal Abidin, 21300 Kuala Nerus, Terengganu, Malaysia
[2]Advanced Nano Materials (ANoMa) Research Group, Faculty of Science and Marine Environment, Universiti Malaysia Terengganu, 21030 Kuala Nerus, Terengganu.
[3]Applied Electromagnetic Research Group (AERG), Faculty of Electrical Engineering,Universiti Teknologi Mara, 40450 Shah Alam, Selangor, Malaysia
[4]International Center for Space Weather Science and Education, Kyushu University, Fukuoka 812-8581, Japan

Abstract

Interplanetary coronal mass ejections (ICMEs) associated with solar flares are regularly released during solar eruptions. This event has been linked to the occurrence of severe geomagnetic storms. As a result, there will be an influence on the space operation infrastructure and ground operation system. The goal of this research is to examine an intense geomagnetic storm on March 24th, 2023 with a symmetric disturbances index (*SYM/H*) of -200 nT and evaluate the CMEs, solar flares, and solar wind conditions associated with the storm. Furthermore, the strong storm associated with CMEs and solar flares has been examined using a low-latitude ground geomagnetic field (*H*-component) measured by a ground-based magnetometer (TRE, -4.21 N, 175.91 E) in Terengganu. According to the data, the halo types of CMEs that occurred from March 20th to March 21st,

2023, may have caused the occurrence of severe geomagnetic activity. The occurrence of an intense geomagnetic storm on March 24th, 2023 is expected to be independent of the speed parameter of CME events (V_{cme}< 2000 kms^{-1}). Simultaneously, an eruption of a solar flare that took place in the southern hemisphere and within -30 degrees of longitude is seen as a necessary prerequisite for an intense magnetic disturbance on March 24th, 2023. CMEs, solar flares, and solar winds linked with the intense geomagnetic storm also proved to excite the ground geomagnetic field (*H*-component) at the TRE station.
This research provides more insight into the potential for space weather ha zards that could disrupt space and ground infrastructure systems.

Keywords: Coronal mass-ejection, solar flare, geomagnetic storm, solar wind, geomagnetic field

ICAS-33

Improving Radio Signal from Baghdad University Radio Telescope Using the Savitzky-Golay Filter

Z. A. Hussein*, H. S. Mahdi
Department of Astronomy and Space, College of Science, Baghdad University, ,Baghdad, Iraq

Abstract

This research paper investigates the application of the Savitzky-Golay filter for improving the quality of radio signals received from the Baghdad University Radio Telescope. The study aims to evaluate the effectiveness of the filter in reducing noise, smoothing the signal, and enhancing overall signal quality. The research methodology involves collecting radio signal data at different azimuth angles, implementing the Savitzky-Golay filter using MATLAB, and analyzing the filtered signals. The results demonstrate that the filter effectively reduces noise and improves the clarity of the radio signals. However, some limitations and trade-offs associated with the filter are also discussed. This study provides valuable insights into the potential of the Savitzky-Golay filter for enhancing radio signals, contributing to the development of signal-processing techniques in radio astronomy.

Keywords: Savitzky-Golay filter, radio telescope, radio signal, signal processing, noise reduction, data smoothing, signal clarity, signal-processing techniques, radio astronomy, Baghdad University Radio Telescope (BURT).

ICAS-35

Analysis of CMEs and Flares during the Early Phase of Solar Cycle 25: Identifying the Most Significant Events

Habeeb Allawi [1] ,Rabab MazhirJasim[2] ,Halah Abbas Jasim[1]
1 Department of physics, College of Science, University of ThiQar, Nasiriyah, Iraq.
2. Department of Astronomy and Space, College of Science, University of Baghdad, Baghdad, Iraq.Email: habeeb.allawi@sci.utq.edu.iq

Abstract
This study examines a dataset including 359 fast and wide coronal mass ejections (CMEs) events that occurred between December 2019 and April 2023, coinciding with the onset of solar cycle 25. Among these events, 355 were associated with C- M- and X-class flare rates were also remarkably observed.
The objective of this research was to identify and analyze these events and then highlights for the two most powerful CME events accompanied by shock waves. The results of our analysis revealed two remarkable CME events that exhibited exceptionally high intensities and were accompanied by shock waves. These events showed distinct characteristics, such as extended eruption durations, rapid CME speeds, and substantial angular widths. The solar flares associated with these CME events exhibited significant intensities, surpassing the C-class threshold and reaching magnitudes in the x range.
Furthermore, the presence of shock waves during these events provided valuable insights into the dynamics and propagation of CMEs. By examining the shock wave signatures, we gained a deeper understanding of the associated physical processes and their potential impacts on the space environment.

In conclusion, this study provides a comprehensive analysis of 359 coronal mass ejections events. By isolating the two most powerful events accompanied by shock waves, we have enhanced our understanding of the dynamics and characteristics of these phenomena during the early stages of solar cycle 25. This research contributes to the ongoing efforts aimed at improving space weather forecasting and mitigating potential impacts on Earth's technological infrastructure.

Keywords: coronal mass ejections, solar flares, solar cycle 25, space weather, geomagnetic disturbances, space weather forecasting.

ICAS-37

The essential of portable hyperbaric oxygen supply for astronauts

Layth Mahmood Karim[1] and Amaal A. Albakri[2]
1. Al Mashreq Private University, College of Dentistry
Email: laeth.mahood@uom.edu.iq
2. University of Baghdad, College of Science.
Email: amaal_2016@sc.uobaghdad.edu.iq

Abstract
Oxygen is very essential for human tissue to perform healthy conditions during rest or active cases in both usual and unusual circumstances, on facing different atmospheric pressure levels.
Astronauts face different challenges during their journey in space, and one of these is oxygen supply, which must be provided constantly with a suitable level in order to maintain their body working properly during their space mission. It is found that an astronaut's partial pressure of oxygen (PO_2) level must be always kept domain among the partial pressure of carbon dioxide (PCO_2) level in blood. This can be done with the aid of using a portable hyperbaric oxygen device throughout their space journey.

Keywords: Hyperbaric Oxygen Therapy, Space Flights, Partial Pressure of Oxygen, Decompression Illness, Astronauts Fitness.

ICAS-38

Temperature trend variation over middle south of Iraq during (2008 -2016)

Doha Al-Feadh[1*], Basaad Hadi Hamza[2]
[1]Physics, Science, Basrah, Basra, Iraq
[2]Physics, Science, Mustansiriyah, Baghdad, Iraq

Abstract
Temperature changes for the troposphere over the central and southern regions of Iraq (Baghdad, Karbala, Basra) were studied for the period(2008-2016).There is a significant difference between the temperatures of Basra province from Baghdad and Karbala provinces in the study periods .The correlation between the annual change of solar spots and the change in temperature for the three provinces was studied and it was found that there is highest correlation between the annual change of solar spots with temperatures in Basra governorate and was 0.64 and the strength of the correlation in Karbala governorate decreased by 0.38 and the lowest was in Baghdad province and reached 0.25 , and then we can say also that the temperature of the air corresponding with sunspot numbers vary inversely with latitude.

Keywords: troposphere, sunspot,air temperature, solar cycle.

ICAS-39

Direction of arrival estimation of meteors echoes using array radio antennas

Imad K. Akeab[1,*], Yasser Chasib Bekheet[1] and Al Najm Mohammed Naji[1]
[1]Department ofAstronomy and Space, College of Science, University of Baghdad, Baghdad, Iraq. *E-mail: Imad.akeab.2017@gmail.com

Abstract
Array antennas have a great interest in the radio astronomy field. This paper estimates the meteors' positions entering the Earth's atmosphere. A simulation for array antenna radar is developed to analyze the meteors echoes in order to process them by the GNU radio software and determine the azimuth and elevation of the meteors. An Improved MUSIC algorithm has been suggested to analyze these echoes. The detected power of each meteor echoes has a Doppler frequency shift due to the high speed of the meteors, which impacted the correctness of DOA estimation. Doppler shift is considered in this simulation. The results show that the suggested method has low complexity and high resolution and can estimate the meteors' position with minimum error.

Keywords: Meteors, Improved Music algorithm, Doppler shift, L-Shape array antenna, GNU Radio.

ICAS-40

Comparative Analysis for the Seasonal Variations of the IF2 and T Ionospheric Indices during Solar Cycles 23 and 24

Huda S. Garee*, Khalid A. Hadi
Department of Astronomy and Space, College of Science, University of Baghdad, Baghdad, Iraq. Email: huda.alhassany9@gmail.com

Abstract
In this work, a comparative analysis for the behavior and pattern of the variations of the IF2 and T Ionospheric indices was conducted for the minimum and maximum years of solar cycles 23 and 24. Also, the correlative relationship between the two ionospheric indices was examined for the seasonal periods spanning from August 1996 to November 2008 for solar cycle 23 and from December 2008 to November 2019 for solar cycle 24. Statistical calculations were performed to compare predicted values with observed values for the selected indices during the tested timeframes. The study's findings revealed that the behavior of the examined indices exhibited almost similar variations throughout the studied timeframe. The seasonal variations were adopted to examine the cross-correlation between the studied indices. The seasonal correlation between tested indices demonstrated that the two indices are highly correlated to each other, with determination coefficient (R^2) values ranging from 0.991 to 0.998 during solar cycle 23 and from 0.996 to 0.998 during solar cycle 24. Furthermore, the results of the comparative analytical study revealed that the mathematical correlation equation between the tested indices could be described as a first-order polynomial equation. The proposed mathematical correlation formula for these two indices exhibited a high level of accuracy and good fit between observed values and generated datasets for all seasons during both solar cycles 23 and 24.
Keywords: Ionospheric Indices, T-index, IF2-index, Solar Cycle.

ICAS-41

Examination the performance of the 0.55µm Adaptive Cassegrain telescope in the IR spectrum

Shurooq Mahdi Ali
Department of Geology, Faculty of Science, University of Kufa,
E-mail Shurooq.alazzawi@uokufa.edu.iq

Abstract
Adaptive systems typically employ two primary means: control (Shack-Hartmann sensors) and monitoring (scientific instruments) in the visible spectrum of incident polarized light. However, to fully understand how these two methods can help achieve adequate system performance, it is useful to study the performance of the adaptive 0.55 µm Cassegrain telescope in the infrared spectrum. Current research employs an algorithmic approach that facilitates the evaluation process. This work is devoted to valuating the Zernike coefficients of adaptive Cassegrain mirrors with F# for the primary mirror = 7, Strehl coefficient = 1, RMS radius = 0.002.

Key words: Adaptive Optics, Cassegrain Telescope, Infrared Radiation, Atmospheric turbulence, Deformable mirrors, Wavefront sensors, Shack-Hartmann sensor, Optical aberration.

ICAS-42

The relationship Type I and Type IV Bursts on March 5, 2012: Observations and Related Phenomena

Nur Zulaikha Mohd Afandi[1] ,Roslan Umar[1*] , Nor Hazmin Sabri[2], Mohd Shazwan Radzi[3], Christian Monstein[4]

[1]East Coast Environmental Research Institute, Universiti Sultan Zainal Abidin, 21300 Kuala Nerus, Terengganu, Malaysia. Email address of the Corresponding Author: roslan@unisza.edu.my

[2]Faculty of Science and Marine Environment, Universiti Malaysia Terengganu, 21030 Kuala Nerus, Terengganu, Malaysia

[3]Radio Cosmology Lab, Physics Department, Faculty of Science, University of Malaya, 50603 Kuala Lumpur, Malaysia

[4]Istituto Ricerche Solari (IRSOL), Università della SvizzeraItaliana (USI), CH-6605 Locarno-Monti, Switzerland

Abstract

With the increasing relation between solar radio bursts(SRBs) and significant solar events, the demand for investigation of each type of SRB worldwide has grown. This is because SRB is a sudden intense emission that is caused by the acceleration of electrons and protons by the Sun's close magnetic field which is solar flare and coronal mass ejections(CMEs). The burst emission varies from centimeter until decameter wavelength can make any possible disturbance on Earth's technology. On 5th March 2012, Type I and Type IV bursts observed. Here we present observations on physical characteristics of the Type I and Type IV SRB using data from the Space Weather Prediction Center, National Oceanic and Atmospheric Administration, EUV, GOES, LASCO(C2 &C3) and e-CALLISTO. We examined the physical characteristics such as duration and time differences on EUV and radio spectrum. Based on the analysis, Type IV burst have associated with Type I when there are X-flare

eruption and full halo CMEs occurred. We suggested that the Type IV burst was associated X-flare while type I bursts were associated at the beginning of the CME.

Keywords:Solar radio burst; Type I; Type IV; characteristics

ICAS-43

Automated Monitoring System for Detection of solar radio bursts for CALLISTO Spectrums

Nur Zulaikha Mohd Afandi[1] , Roslan Umar[1*] , Nor Hazmin Sabri[2*], Suhailan Safei[3], Christian Monstein[4]

[1]East Coast Environmental Research Institute, Universiti Sultan Zainal Abidin, 21300 Kuala Nerus, Terengganu, Malaysia

[2]Faculty of Science and Marine Environment, Universiti Malaysia Terengganu, 21030 Kuala Nerus, Terengganu, Malaysia. Email: norhazmin@umt.edu.my

[3]Faculty of Informatics and Computing, Universiti Sultan Zainal Abidin, 22200 Besut, Terengganu, Malaysia.

[4]Istituto Ricerche Solari (IRSOL), Università della SvizzeraItaliana (USI), CH-6605 Locarno-Monti, Switzerland

Abstract

In recent times, continuous monitoring of solar radio bursts using ground spectrometers has become crucial for solar researchers, especially in predicting space weather. Solar burst Type II, Type III, and Type IV events are linked to significant solar flare and coronal mass ejections (CMEs), which can impact human activities by affecting Earth's magnetosphere. Since 2002, CALLISTO spectrometers have collected data, accessible through e-Callisto.org, yet detection and classification of solar radio bursts were labor-intensive manual processes. This study aims to streamline and enhance the monitoring of solar radio bursts, specifically SRBT II, SRBT III, and SRBT IV, by developing an automated system for CALLISTO. This system, divided into three key stages (burst-finder, burst-classifier, and monitoring), was tested on both pre-training and real data, achieving an 87% success rate in burst detection and 61% success in burst

classification. Positive burst results are displayed on the user-friendly website http://solar.myfik.net, offering a valuable tool for CALLISTO-based solar burst monitoring and aiding space weather forecasting research.

Keywords: Solar radio burst, Callisto, Automated spectrum analysis, MATLAB, Algorithm.

ICAS-44

Optical Variability Links SMBHs and Star Formation in Active Galaxies

Narjes Abd Al_rhman Japar, Yasir Ezzuldeen Rashed
Department of Astronomy and Space, Collage of Science, University of Baghdad, Baghdad, Iraq. E-mail: nrjs220@gmail.com

Abstract
An optical spectral variable has been reported this research, additionally, to knowing their relationship with supermassive black holes (SMBH), as well as their relationship with the star formation rate (SFR) for 29 samples of active galaxies classified for 19 samples of the Quasar type and 10 samples of the Seyferts type that has been taken from the Sloan Digital Sky Survey SDSS, at intervals different times have been monitored twice to more during a period of time approximately 10 years. The results in this article shows that the value of standard deviation star formation rate variability with respect to SMBH in QSO are higher than the standard deviation star formation rate variability with respect to SMBH in Seyferts as present respectively (19.5 and 16.8) in a factor of ~2. Furthermore, a good correlation has been found between the SMBH and the SFR for Seyfert galaxies, while there is clear correlation between SMBH and SFR for QSO galaxies due to the highly influence of bright active galactic nuclei. Additionally, the variability of the emission-lines ([O_{II}], [H_{β}], [O_{III}], [H_{α}], [S_{II}]) has been studied for the both samples (QSO and Seyferts) and it found that (([H_{β}], [O_{II}], [S_{II}]) are highly affected by the gravitational bound system of the central black hole. As for physical properties it shown that as the center mass of black holes increases, so does the bulge host mass (Mbulge), leading us to infer that high-luminosity galaxies create stars more rapidly than other types of galaxies.
Keywords: Active Galaxies, Seyfert, Quasar, Variability, Spectra.

ICAS-45

EXPLORING THE LIMITATIONS OF OPTICAL DEVICES FOR NEW MOON VISIBILITY: A CASE OF SARAWAK, MALAYSIA

Ahmad Hariz Bely[1], Ahmad Lutfi Afifi Mohd Nasir[1], Roslan Umar[1]*, Zamri Zainal Abidin[2], Hezret Harrani Su'uddi[3], Mohamad Iskandar Spawi[3], Arwin Juli Rakhmadi[4]

[1]East Coast Environmental Research Institute (ESERI), Universiti Sultan Zainal Abidin, 21300 Kuala Nerus, Terengganu, Malaysia. Email roslan@unisza.edu.my
[2]Department of Physics, Faculty of Science, Universiti Malaya 50603 Kuala Lumpur, Malaysia
[3]Sarawak Mufti Department, Falak Division, 93400 Kuching, Sarawak, Malaysia
[4]Universitas Muhammadiyah Sumatera Utara (UMSU), Medan, Sumtera, Indonesia

Abstract

New Cresent Moon visibility has been extensively studied by astronomers throughout history due to its undeniable importance in determining the local Islamic calendar. Previous visibility models have relied on linear statistical theory, which does not fully account for the circular nature of the variables involved. To address this limitation, this study proposes new visibility using the limitation of New Cresent Moon sighting using via an optical device. The data will categorize into two visibility categories: visible with naked eyes and potentially requiring optical aid based on which night visibility have been captured. The categorization is determined based on the residuals local Sarawak data of the *fitted* circular regression model. The proposed model is applied to 31 total of data observations collected at Sarawak, spanning 1997 to 2023. Results indicate that the visibility test based on moon ages and altitude of the moon yields the

lowest misclassification rate. Accordingly, the study suggests the limitation of New Cresent Moon sighting using an optical device is to be 12 hours 59 minutes of moon age with a moon altitude of 05°44’08”. These new criteria limitation have a significant positive impact on enhancing the likelihood of observing the New Cresent Moon and improving the accuracy of the Islamic calendar in Sarawak.

Keyword: Correlation, Limitation, Observation Device, New Moon, Sarawak.

ICAS-49

Study of Radio Hydrogen Emission Line 21cm by Observation of the Source 3C 400 using BURT

Faten Samer Ali*[1], Kamal M. Abood[2]
1,2Astronomy and Space Department, College of Science, University of Baghdad, Baghdad, Iraq. Email: Fatensa1997@gmail.com

Abstract
This study is concentrated for observing the radio source (3C400) at the wavelength of 21cm. The 3C 400 coordinate is (RA $19h23'42''$) (DEC$14^{\circ}30'33''$) which is suitable for radio observing from the city of Baghdad. In addition, this source is convenient radio source which can be detected by a small radio telescope such as Baghdad University Radio Telescope (BURT) the (3C 400) object is observed during three months (February, April, May) from (23/2/2023 until 16/5/2023).In different time period duration the results showed that the more stability in recording signal through the observation period. Then, a curve fitting process is carried out on observation data which is found to be obeyed of a linear behavior a final conclude that line equation is$(y = a\,x - b)$.

Keywords: radio astronomy, hydrogen line emission, radio observation, 3C 400 radio source, BURT

ICAS-51

Derivation a New Nuclear State Density Equation in a Two-Component Pre-Equilibrium Exciton Model with Non-Equidistant Spacing Model

Hanan Majid Saleh(1), Ahmed A. Selman(2)
(1) Department of Physics, College of Education for women, University of Kirkuk
(2) Department of Astronomy and space, College of Science, University of Baghdad

Abstract
A new equation for two-components particle-hole state densities with non-Equidistant Spacing Model (non-ESM) of single-particle level density s.p.l.d. dependency on the particle excitation energy u is derived. Two methods were utilized to build a novel level density parameter equation, which is compensated in the final level density equation and explicit state density solution for two-component Fermi gas with (non-ESM). The first method is based on the Taylor series and the second method is based on Gamma function properties and substituting equations of the s.p.l.d. directly. Analytical comparisons with ESM standard formulations reveal that the approach reduces to older, more generic methods for calculation state density. Pauli blocking energy was added, and numerical simulations reveal an excellent improvement in the behavior as the exciton number and number of iterations are increased. According to the numerical calculations, the number of excitons and iterations will increase at higher energies, improving the result and bringing it closer to the standard Ericson's and Williams' formulae for the same configuration. Therefore, this new equation represents a significant advancement and addition to the study of state density calculation.
Keywords: Exciton model, Pre-equilibrium reactions, Level density, non-ESM, two components system.

ICAS-56

Identify the differences between ordinary and barred spiral galaxies, NGC 2649 and NGC 4662 for examples

Abdulla K. Ahmed[1*], Anas S. Taha[1], Arshed Ali[1]
[1]Astronomy and Space Department, College of Sciences, University of Baghdad, Baghdad, Iraq

Abstract
Since the beginning of mankind, the view of the sky was present through observations with the naked eye, then it developed with time, and the sciences and tools of astronomical observations developed, including photometric measurements, which reached a high degree of accuracy in describing various cosmic phenomena, including the study of galaxies, their composition, and the differences between them, and from here the importance of this study emerged, to determine the differences between two distinct types of classification of galaxies, which are normal and barred spiral galaxies, where two galaxies NGC 4662 and NGC 2649 were chosen that represented certain types of galaxies to study the morphological structure of the two galaxies, as well as the photometric study of the composition of the two galaxies, where a contour map was drawn, as well as finding the values of the photometric variables and studying them on all of the two galaxies, including the position angle, the ellipticity and B4. A fitting was made for the two galaxies to show the fundamental difference in composition, through which to identify the basic differences between two known types of galaxies. Finally, this paper used Python code to plot the spectral energy distribution for each galaxy, the shape of the SED can provide with more information about the population of the old star in the galaxies from increasing infrared emission.

Keywords: barred ,spiral galaxies, morphological, NGC 4662 , NGC 2649.

ICAS-58

A Comparative Investigation of Different Ionospheric Models to Predict the MUF Parameter During Sever Geomagnetic Storm on 17th March 2015

Ola T. Mousa and Khalid A. Hadi
Department of Astronomy and Space, College of Science, University of Baghdad, Baghdad, Iraq.Email: olathamermousa@gmail.com

Abstract
The present work aimed to make a comparative investigation between three different ionospheric models: IRI-2020, ASAPS and VOACAP. The comparative study aimed to investigate the compatibility of predicting the Maximum Usable Frequency parameter (MUF) over mid-latitude region during the sever geomagnetic storm on 17th March 2015. For the investigation purposes three stations that distributed over mid-latitude region were selected; these are (Athens (23.50° E, 38.00° N), Je Ju (124.53° E, 33.6° N) and Pt. Arguello(239.50° W,34.80° N). Daily calculations of the MUF parameter were conducted for a span of five days (day of event and two days preceding and following the event day) using the three tested models for the three adopted stations. The calculated datasets were compared with the observed MUF values for each of the three selected locations. In general, the results of the conducted study showed that the three tested models gave good results compared to the observed data for all selected stations. The comparative investigation results of the three tested models corresponding to the observed MUF values during the storm event revealed that the IRI Model indicate a clear impact of the geomagnetic storm on the predicted MUF values during the day of event. Similarly, for ASAPS Model, the storm's impact is clear on both the day of the event and the subsequent day, in contrast, the VOACAP model showed almost no impact of the geomagnetic storm on the observed MUF values throughout the entire study period for event 17th March 2015.
Keywords: Ionospheric Parameters, Maximum usable frequency, IRI-2020 Model, ASAPS Model, VOACAP Models.

ICAS-59

Monthly variations and long-term trends of tropospheric O_3 and CO over Iraq (2003 -2021) using AIRS data

Marwa H. Al-Bayati[1*], Jasim M. Rajab[1], Hazim G. Daway[2], and Hwee San Lim[3]

[1] Department of Atmospheric Sciences, College of Science, Mustansiriyah University, Baghdad, Iraq
[2] Department of physics, College of Science, Mustansiriyah University, Baghdad, Iraq
[3]School of Physics, Universiti Sains Malaysia, 11800 Penang, Malaysia.

Abstract

The global monitoring of ozone (O_3) and carbon monoxide (CO) are indeed crucial due to their significant roles in atmospheric chemistry and their impact on climate. The aim of this research is to demonstrate the monthly distributions of tropospheric CO and O_3 and analysed its long-termduring the years 2003–2021. over Iraq using the Atmospheric inferred sounder (AIRS) data. The monthly CO time series reveled variance changes and fluctuated, minimum (decreases, Jun and September) and maximum (increases, October and April), these seasonal variations depends on topography and meteorological conditions, the total mean value and standard deviation of CO was (1208.6×10^{-10} ± 230.8×10-^{10}ppv) during study period. The monthly O_3 time series variance between seasons, elevated from January till its peak in May and declined from September to October. These O_3 seasonal variations depend greatly on climate changes, meteorological parameters, and location in the atmosphere. , the total mean value and standard deviation of O_3 was (446.4×10^{-10} $\pm76.2\times10^{-10}$ppv). The monthly CO values variances among the seasons over five considered selected stations; Baghdad, Mosul, Basra, Kirkuk, and Rutba. The highest

CO value was in northern regions (Mosul; 510×10^{-10}ppv) compared with other stations, and the lowest CO value was in western region (Rutba; 934×10^{-10}ppv). For O_3, the highest value was in Mosul (456×10^{-10}ppv), and the lowest value was in Basra (431×10^{-10}ppv). The CO results shows negative trends in their annual series over all stations, and the O_3 results shows negative trends at all station except in Basra have significant positive trends. The results indicate the efficient use of AIRS data features analysis to evaluate and estimated the distributions of the tropospheric CO and tropospheric O_3 over study area.

Keywords: Seasonal variation, trends, AIRS, Air pollution,Iraq