

C.V  
السيرة العلمية



الاسم : د.سندس عبد العباس عبد الله البكري

الحالة الزوجية : متزوجة

عدد الأولاد : 3

الديانة : مسلم

التخصص : دكتوراه فيزياء / تحسس نائي

الوظيفة : استاذ مساعد

الدرجة العلمية : دكتوراه

عنوان العمل : رئيس قسم التحسس النائي ونظم المعلومات الجغرافية /كلية العلوم/جامعة بغداد

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أولاً : المؤهلات العلمية .

| الدرجة العلمية | الجامعة | الكلية | التاريخ   |
|----------------|---------|--------|-----------|
| بكالوريوس      | بغداد   | العلوم | 1993-1992 |
| الماجستير      | بغداد   | العلوم | 2001      |
| الدكتوراه      | بغداد   | العلوم | 2012      |

ثانياً: التدرج الوظيفي

| ت | الوظيفة            | الجهة                                      | الفترة من - الى   |
|---|--------------------|--|---|
| 1 | مدرس مساعد         | قسم الفلك/كلية العلوم/جامعة بغداد          | 2008-2003   |
| 5 | مدرس/طالبة دكتوراه | قسم الفيزياء/كلية العلوم/جامعة بغداد       | 2012-2008   |
| 6 | مدرس               | قسم الفلك والفضاء /كلية العلوم/جامعة بغداد | 2013-2012   |
| 7 | استاذ مساعد        | قسم الفلك والفضاء /كلية العلوم/جامعة بغداد | 2018 - 2013<br>ولازلت-- الان احضر<br>للحصول على درجة<br>استاذ |

\* من الاوائل في التقييم الاكاديمي لاساتذة كلية العلوم للاعوام 2015-2016, 2014-2015

ثالثا : المقررات الدراسية التي قمت بتدريسها.

| ت | القسم                                       | المادة   | السنة                |
|---|---|--|----------------------|
| 1 | قسم الفلك/كلية العلوم/جامعة بغداد           | General Physics Lab.& Atomic lab<br>2 <sup>nd</sup> year physics   | 2005-2003            |
| 2 | قسم الفلك/كلية العلوم/جامعة بغداد           | AtomicLab .& Computer Lab.<br>2 <sup>nd</sup> Year Physics   | 2008-2005            |
| 3 | قسم الفلك / كلية العلوم/جامعة بغداد         | amental +Astrophysics/1 <sup>st</sup> Year Astronomy<br>Observation Lab/1 <sup>st</sup> Astronomy  | 2014-2008            |
| 4 | قسم الفلك والفضاء/كلية العلوم/جامعة بغداد   | Cosmology /4 <sup>th</sup> year Astronomy.<br>Research projects<br>4 <sup>th</sup> Year Astronomy<br>+Observation lab+ Mechanics lab/ 1 <sup>st</sup><br>+year | 2017-2014<br>ولا زلت |
| 5 | قسم الفلك والفضاء/كلية العلوم/جامعة بغداد   | Interstellar Medium/3 <sup>rd</sup> year Astronomy   | 2017-ولا زلت         |
| 6 | قسم الفلك والفضاء / كلية العلوم/جامعة بغداد | Special Topics and Seminar/ M.Sc.<br>Extragalactic Astronomy/ <b>Ph.D</b> .<br><br>Special Topics and Seminar/ M. Sc.<br>Seminar /M.Sc.                        | 2017-2012<br>ولا زلت |

رابعاً: ( الاطاريح ، الرسائل ) التي أشرفت عليها:

| No | Thesis Title  | Department   | Yea       |
|----|---|--|-----------|
| 1  | Study characteristic properties for neutron stars within light cylinder limits and pulses glitches / M.Sc | Astronomy and Space  | 2015-2016 |
| 2  | اثر النظريات العلمية التجريبية في تفسير الايات الكونية /Ph.D.   | University of Kufa -<br>جامعة كوفة<br>Faculty of Fiqh -<br>كلية الفقه<br>Department of the Koran | 2017      |
| 3  | التحقق من العلاقة بين الاشعاع الشمسي والتذبذب الحراري للعراق باستخدام تقنيات التحسس الناني                | Astronomy and Space  | 2018      |

المشاركة في اللجان العلمية والادارية

| اسم اللجنة   | الجهة   | التاريخ                          |
|--|---|----------------------------------|
| اللجنة الامتحانية لقسم الفلك والفضاء - ع-27-4904<br>*لجنة الرصد الليلي | كلية العلوم- قسم الفلك والفضاء<br>كلية العلوم | 2013-2018 ولازلت<br>2013- ولازلت |
| مقررة الدراسة الاولى المسائية لقسم الفلك والفضاء                       | كلية العلوم - قسم الفلك والفضاء               | للاعوام 2014-2015 و<br>2015-2016 |
| لجنة اعلام قسم الفلك والفضاء   | كلية العلوم - قسم الفلك والفضاء               | 2012-2015 ومازلت                 |
| لجنة رصد الظواهر الفلكية والاحداث الفلكية                              | كلية العلوم- قسم الفلك والفضاء                | 2012-2015 ومازلت                 |
| مسؤولة لجنة الموسم الثقافي والمحاضرات العلمية لقسم الفلك والفضاء       | كلية العلوم- قسم الفلك والفضاء                | 2012-2015 ومازلت                 |
| لجنة استلال- العدد 7-511   | كلية العلوم- قسم الفلك                        | 2013                             |

|                  |                                   |  |
|------------------|-----------------------------------|--|
|                  | والفضاء                           | تاريخ 8-10-2013  |
| 2013             | كلية العلوم- قسم الفلك<br>والفضاء | لجنة تفعيل دور الترابط بين<br>الطلبة والخريجين واساتذة<br>القسم- عدد 7/ 78 |
| 2016-2017 ولازلت | كلية العلوم- قسم الفلك<br>والفضاء | لجان الارشاد التربوي   |



## خامساً : الأنشطة العلمية

| خارج الكلية   | داخل الكلية  |
|---|--|
| 1- رئيسة لجان وعضو في مناقشة العديد من رسائل واطاريح دكتوراه في جامعة بغداد، المستنصرية، ذي قار، صلاح الدين | 1-- عضو في اللجنة الامتحانية للدراسات الاولى في قسم الفلك من 2012-2017 ولازلت  |
| 2- محاضرة في وزارة الداخلية- المعهد العالي للتطوير الامني- لضباط وزارة الداخلية                             | 2- مقررة الدراسات الاولى المسائية في قسم الفلك 2014  |
| 32- رئيس لجنة استلال ومقيم بحوث لاغراض الترقية او النشر وخبير علمي في جامعة بغداد، كربلاء – المستنصرية-     | 3- عضو في مجلس القسم من 2014-ولحد الان   |
| 3- عضو لجنة الترقيات العلمية في الهيئة العراقية للحاسبات من 2012 ولحد الان                                  | 4-عضو في اللجنة الامتحانية للدراسات الاولى 2010-2011   |
| 4- مقيم علمي في مجلة علمية اجنبية (IJAA)  | 5- رئيس وعضو في لجان مشاريع المرحلة الرابعة من 2008-ولحد الان  |
| لمؤسسة البحث العلمي العالمية- الصين ومعامل تاثير 0.95   | 6- عضو في العديد من لجان مناقشات طلبية الدراسات العليا لقسم الفلك ولجان الاستلال لرسائل الماجستير وبحوث الترقيات العلمية واطاريح الدكتوراه |
| International Journal of Astronomy and Astrophysics   | 7- خبير في تقييم بحوث الترقيات العلمي  |
| 5- المشاركة بمهرجان السيادة وبالتعاون مع وزارة الشباب   | 10- عضوة في اللجنة التحضيرية للندوة العلمية وبالتعاون مع مركز احياء التراث العربي للعام 2016   |
|   | 11- عضو ارتباط للجنة الاعلام لقسم الفلك والفضاء للاحوام 2014-2016  |
|   | 12- عضو في اللجنة الامتحان التنافسي لطلبة الدراسات العليا الدكتوراه  |
|   | 13- عضو في تحرير واصدار نشرة فلكية لقسم الفلك والفضاء للاحوام 2013-2014-2015   |
|   | 14- لجنة رصد الظواهر الفلكية والفعاليات في داخل قسم الفلك للعمليات الرصدية   |

سادسا : المؤتمرات والندوات العلمية التي شاركت فيها

| No. | Conferences Title  | Year          | Place                                  | Type of Participation |
|-----|--|---------------|--|-----------------------|
| 1   | 3. Participation at the Seventh Arab Conference on Physics & Astronomy 15-17 August 2005 at Jordan   | 2005          | Jordan<br>المملكة الاردنية<br>الهاشمية | Research              |
| 2   | 4. Participation in the Educational Qualifying Course held by University of Baghdad from 4/2/2006 to 8/2/2006.   | 2006          | IRAQ                                   |                       |
| 3   | Participation in Arab conference in Algeria  | 2010          | Algeria<br>الجزائر                     | Research              |
| 4   | International conference on physics and Engineering – Baghdad-Iraq   | 2013          | IRAQ                                   |                       |
| 5   | International conference of remote sensing- Baghdad-Iraq   | 2014          |  | Research              |
| 6   | The Arab Conference on Astronomy and Geophysics 5th Assembly 17-20 October 2016 Helwan-Cairo, Egypt  | 2016          | Egypt<br>مصر                           | Research              |
| 7   | 6th International Conference and Workshop on Basic and Applied Sciences<br>Website:<br><a href="http://icowbas2017.su.edu.krd">http://icowbas2017.su.edu.krd</a> | 2017          | IRAQ-Erbil<br>اربيل                    | Research              |
| 8   | ١<br>مؤتمر المرأة العراقية عالمة ومبدعة<br>جامعة بغداد- كلية العلوم  | 2017          | IRAQ                                   | Research              |
| 9   | المشاركة ب30 ندوات داخل وخارج القطر  | -2012<br>2017 | IRAQ                                   |                       |

## سابعاً: كتب الشكر.

| الجهة   | السبب  | التاريخ                                  |
|---|--|--|
| كتاب شكر من رئيس جامعة بغداد                                | نشر بحث في مجلة عالمية<br>رصينة تابعة لمؤسسة<br>السفير ومعامل<br>تأثير - SCUPAS  | 2018                                     |
| 1-كتاب شكر وتقدير<br>من رئيس جامعة<br>بغداد                 | اعتمادنا كمقيم علمي في<br>المجلة العلمية العالمية<br>الرصينة (IJAA) (IF=1.2),  | 2014                                     |
| 2-كتاب<br>شكر وتقدير من<br>رئيس جامعة<br>بغداد              | نشر بحث علمي في المجلة<br>العلمية العالمية الرصينة<br>(IJAA)   | 2013                                     |
| كتاب شكر من<br>مساعد رئيس<br>جامعة بغداد-                   | نشر بحث علمي في مجلة<br>العالمية<br>الرصينة (IJPR) (IF<br>=1.45)   | 2013                                     |
| كتاب شكر من<br>مساعد رئيس<br>جامعة بغداد                    | نشر بحث علمي في المجلة<br>العلمية العالمية IJAA  | 2013                                     |
| كتاب شكر من<br>عميد كلية العلوم                             | نشر وطباعة النشرة الفلكية<br>الشهرية الطيف للاخبار<br>العلمية والفلكية والاحداث<br>الفلكية   | 2012                                     |
| كتاب شكر من<br>عميدة كلية<br>التربية للبنات-<br>جامعة بغداد | المشاركة في مؤتمر علمي<br>ببحث   | 2011                                     |
| كتاب شكر من<br>عميد كلية<br>التربية<br>الاساسية- بابل       | المشاركة ببحث في المؤتمر<br>العلمي لكلية التربية الاساسية<br>بالتعاون مع كلية العلوم-<br>يغداد   | 2012                                     |
| 5 كتب منح قدم<br>من رئيس جامعة<br>بغداد                     | 1- لاعتمادنا كمقيم علمي في<br>المجلة لعلمية العالمية<br>IJAA<br>2- نشر بحث علمي في<br>المجلة العلمية العالمية<br>IJAA<br>3- من الاوائل في دورة | 1-2014<br>2016+2015+<br>2-2013<br>3-2005 |

| طرائق التدريس      |  |  |
|--------------------|--|--|
| 2016-2015          | كوننا الاوائل في التقييم<br>الاكاديمي لكلية العلوم<br>للعام الدراسي 2015                     | كتاب شكر من<br>عميد كلية العلوم                          |
| 2015-2014-<br>2016 | لعملنا في اللجان الامتحانية<br>للسنوات 2015-2014-<br>2016 2017 ولا زلنا ....                 | 4 كتب شكر من<br>عميد كلية العلوم                         |
| 2017               | لمشاركتنا في مؤتمر العلمي<br>العالمي لجامعة صلاح الدين -<br>اربيل                            | كتاب شكر من<br>رئيس جامعة<br>صلاح الدين                  |
| 2018-2017          | وزارة الداخلية- المعهد<br>العالي للتطوير الامني<br>والاداري- القاء محاضرات<br>لضباط الداخلية | 2 كتاب شكر من<br>عميد المعهد<br>العالي للتطوير<br>الامني |

المواد والمحاضرات التي قمت بتدريسها منذ حصولي على الدكتوراه 5-9-2012

### النظري

- 1- مادة Extragalactic Astronomy لطلاب الدكتوراه ولازلت ....
- 2- - مادة فيزياء الكونيات Cosmology لطلاب المرحلة الرابعة ولازلت....
- 3- مادة ( Astronomy Basics ) - الفصل الدراسي الاول لعامي 2013-2014-  
ومازلت ( صباحي ومسائي)
- 4- مادة معالجة الملوثات البيئية لطلاب الاولى في قسم التحسس النائي ونظم  
المعلومات الجغرافية GIS
- 3-مادة فيزياء الفلك نظري ASTROPHYSIC - الفصل الدراسي الثاني لعامي  
2013-2014 ومازلت - (صباحي ومسائي)
- 5- (10) مشاريع تخرج لطلاب المراحل المنتهية
- 6- سمنار لطلاب الدراسات العليا
- 7- موضوع خاص لطلبة الدراسات العليا ( Special Topic)
- 8- الاشراف على طلبة الدراسات العليا ماجستير ودكتوراه

### **Membership:** العضوية الجمعيات الفلكية والمؤسسات التالية

- Arab Union for Astrophysics' (الاتحاد العربي لعلوم الفلك والفضاء)
- عضوة في الاتحاد العراقي للصحفيين العراقيين
- عضوة في مؤسسة الشرق الاوسط للاعلام
- عضوة في جريدة التاخي اليومية ( محررة )
- عضوة في مجلة الخدمات الاقتصادية ( كتاية مواضيع علمية )

### **languages:**

- ✓ Arabic
- ✓ English

### **Publications**

### IJAA Acceptance Letter

Dear Author,

We are glad to inform you that your manuscript:

Paper Title: THE MECHANISM OF INTERACTING STELLAR WINDS BEYOND RED GIANT  
BRANCH

Paper ID 4500208

Authors Sundus A. Abdullah Albakri, Sinan H.Ali

is accepted by International Journal of Astronomy and Astrophysics (IJAA). Congratulations!!  
The tentative publishing time is in Vol.3 No. 4.

If you have any other questions, please do not hesitate to contact as soon as possible. Thanks  
for your support to our Journal.

Best wishes

Yours sincerely,

Aline Xiao

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### CERTIFICATE OF PUBLICATION

Reference: IJPR-Aug-2013-6

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This certifies that the research paper entitled "Determination of the Dynamic Age for the Nebula Using IRIS Technique" authored by "Sundus A. Abdullah Albakri & Loay K. Abood" was reviewed by the board and published in "International Journal of Physics and Research (IJPR); ISSN(Print):2250-0030; ISSN(Online):2319-4499; Volume: 3; Issue: 3; Impact Factor(JCC): 1.4526"

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## Distances Scale Determination for a Planetary Nebula in Galactic Bulge

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### ABSTRACT

Planetary Nebulae (PN) distances represent the fundamental parameter for the determination the physical properties of the central star of PN. In this paper the distances scale to Planetary Nebulae in the Galactic bulge were calculated related to previous distances scales. The proposed distance scale was done by recalibrated the previous distance scale technique CKS/D82. This scale limited for nearby PN ( $D \leq 3.5$  kpc), so the surface fluxes less than other distance scales. With these criteria the results showed that the proposed distance scale is more accurate than other scales related to the observations for adopted sample of PN distances, also the limit of ionized radius ( $R_{\text{ion}}$ ) for all both optically thick and optically thin in the rang of sizes ( $0.45 > R_{\text{ion}}$  (pc)  $> 0.03$ ).

**Keywords:** Planetary Nebulae; Masses; Distances Planetary Nebulae

### 1. Introduction

There are several methods available to determine individual distances, independent of any assumptions concerning the information on the properties of the Nebula. These distances give independent information on the properties, of the nebula, especially mass and density for the nebulae [1,2].

By making certain assumptions on the nebular structure, distances can be calculated by measurement of fluxes, angular sizes, and electron densities. These methods called statistical distances [3]. As well determined distance scale for Planetary Nebulae (PN) is necessary for the investigation of the space density, galactic distribution, total number of PN, and the birth rate of PN in the galaxy [2,4].

### 2. Previous Distances Scales

The previous statistical distances rely on Planetary Nebulae sharing certain common physical properties and the previous distances are derived from the measurement of two or more nebular parameters [1]. A number of theoretical mass-radius relationships have been constructed based on the H-burning tracks of Schonberner and Blocker (BS90) and various models of nebular expansion as Zhang and Kwok (1993) and Mellema (1994) [5,6].

During the last decade several such distance scales have been proposed, notably Cahn *et al.* (1992) (here after CKS), Van de Steen and Zijlstra (1995) (VdSZ), Zhang (1995) (Z95), Schneides and Buckley (SB96), and Stanghelline and Shaw with Villaver (2008) (SSV). The previous scales which will be indicated in this work as the following:

Daub in 1982 used an empirically relation between the ionized masses of Planetary Nebulae and a particular function of observational quantities was used to calculate the distances to the samples of Planetary Nebulae. These distances are used to investigate the scale height of the galactic distribution of Planetary Nebulae (125 pc), the rate of formation of Planetary Nebulae ( $5 \pm 2 \times 10^{-3}$  PN  $\text{kpc}^{-3} \cdot \text{yr}^{-1}$ ). The effective ionized mass ( $\mu$ ) define as [4]

$$\mu = \frac{M_{\text{ion}}}{\epsilon V^2} = \sqrt{2.26 \times 10^{-21} S_{5\text{GHz}} D^3 \theta^3} \quad (1)$$

where  $M_{\text{ion}}$  is the ionized mass of PN in Sun mass unit (solar mass);  $\epsilon$  is the filling factor used to allow for the non spherical geometry of the nebula

$\theta$  is the angular diameter in arcs unit

$S_{5\text{GHz}}$  is the radio flux at 5 GHz in  $\text{W} \cdot \text{m}^{-2} \cdot \text{Hz}^{-1}$  unit, or called Janskys (Jy) unit where  $\text{Jy} = 10^{-26} \text{W} \cdot \text{m}^{-2} \cdot \text{Hz}^{-1}$ ,  $D$  is the distance in parsec unit (pc).

## The Mechanism of Interacting Stellar Winds beyond Red Giant Branch

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### ABSTRACT

The dynamical processes of the interaction of slow wind beyond Red Giant phase with fast wind of central star of nebula are evaluated. The mechanism of interaction stellar wind model (ISW) is found to be responsible for producing a relatively dense shell of gas which increases in mass and radius at a constant rate. Both slow wind and superwind are assumed to be time independent and radial density is calculated at initial time  $t_0 \sim 60$  yrs with the fast wind velocity ( $v \approx 1000$  km/s). The results showed that, at the outer rim of super wind region, a small density hump appears due to the relative velocity between slow winds and central star winds, in a good agreement with the previous models. The dynamical requirements of the observed expansion of planetary nebulae can be satisfied by the mechanism of interacting stellar wind model with reasonable mass loss rate from central star.

**Keywords:** Nebulae; Stars; Evolution; Mass Loss

### 1. Introduction

It is now widely accepted that Red Giant Branch (RGB) is the progenitors of the nebulae but the details of the transition from one type of object to the other are not known [1,2]. The importance of mass loss is demonstrated by the fact that the remnant of the Asymptotic Giant Branch (AGB) stars, the Proto Planetary Nebulae (PPN) and white dwarfs have mass distributions peaked closely around  $(0.6 M_{\odot})$  [3,4], while the main sequence masses of these objects must have been  $\geq 1 M_{\odot}$  [5,6].

It is significant that appreciable mass loss which occurs from red giant producing an extensive circumstellar envelope has become "visible" with the advent of IR and Microwaves techniques [7]. The importance of Red-Giant mass loss in the formation of PN is obviously dependent on the transition time from Red Giant to PN [5].

For stars with core masses between 0.6 and  $1.2 M_{\odot}$ , Paczynski (1971) argued that the transition is relatively rapid, particularly for high mass stars. Renzini (1981) with Marigo (2002) and Kwok (2005) have also convincingly argued that this transition time cannot be longer than the expansion time of PN ( $\sim 10^4$  yr) otherwise

the nebulae will not be ionized before it disperses into the interstellar medium [8,9]. Given the short transition time scale, the extensive circumstellar envelope created by steady mass loss during the AGB should not be of neglected in the treatment of the formation process of PN, regardless of the ejection mechanism [1,8].

The interacting stellar winds model for the evolution stars has had considerable success in explaining various features for the planetary nebulae and white dwarf [10]. Stars can be divided into three main categories by mass-low, intermediate and high mass. The boundaries are determined by the minimum needed by a star to form its first degenerate core as shown in Table 1 [11].

- Low mass stars: develop degenerate He core while ascending the RGB. He ignition occurs explosively the helium flash. The increased core temperature causes the degeneracy to be lifted. The core expands, and He burning becomes stable. Eventually they develop degenerate C/O core before ending as white dwarf [2,10].
- Intermediate mass stars: burn He and then develop degenerate C/O cores.
- High mass stars: between 8 and  $11 M_{\odot}$  (or  $M_{\odot}$  (solar mass)), stars undergo C fusion before developing

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### ABSTRACT

The dynamical processes of the interaction of slow wind beyond Red Giant phase with fast wind of central star of nebula are evaluated. The mechanism of interaction stellar wind model (ISW) is found to be responsible for producing a relatively dense shell of gas which increases in mass and radius at a constant rate. Both slow wind and superwind are assumed to be time independent and radial density is calculated at initial time  $t_0 \sim 60$  yrs with the fast wind velocity ( $v \approx 1000$  km/s). The results showed that, at the outer rim of super wind region, a small density hump appears due to the relative velocity between slow winds and central star winds, in a good agreement with the previous models. The dynamical requirements of the observed expansion of planetary nebulae can be satisfied by the mechanism of interacting stellar wind model with reasonable mass loss rate from central star.

**Keywords:** Nebulae; Stars; Evolution; Mass Loss

### 1. Introduction

It is now widely accepted that Red Giant Branch (RGB) is the progenitors of the nebulae but the details of the transition from one type of object to the other are not known [1,2]. The importance of mass loss is demonstrated by the fact that the remnant of the Asymptotic Giant Branch (AGB) stars, the Proto Planetary Nebulae (PPN) and white dwarfs have mass distributions peaked closely around  $(0.6 M_{\odot})$  [3,4], while the main sequence masses of these objects must have been  $\geq 1 M_{\odot}$  [5,6].

It is significant that appreciable mass loss which occurs from red giant producing an extensive circumstellar envelope has become "visible" with the advent of IR and Microwaves techniques [7]. The importance of Red-Giant mass loss in the formation of PN is obviously dependent on the transition time from Red Giant to PN [5].

For stars with core masses between 0.6 and  $1.2 M_{\odot}$ , Paczynski (1971) argued that the transition is relatively rapid, particularly for high mass stars. Renzini (1981) with Marigo (2002) and Kwok (2005) have also convincingly argued that this transition time cannot be longer than the expansion time of PN ( $\sim 10^4$  yr) otherwise

the nebulae will not be ionized before it disperses into the interstellar medium [8,9]. Given the short transition time scale, the extensive circumstellar envelope created by steady mass loss during the AGB should not be neglected in the treatment of the formation process of PN, regardless of the ejection mechanism [1,8].

The interacting stellar winds model for the evolution stars has had considerable success in explaining various features for the planetary nebulae and white dwarf [10]. Stars can be divided into three main categories by mass-low, intermediate and high mass. The boundaries are determined by the minimum needed by a star to form its first degenerate core as shown in Table 1 [11].

- Low mass stars: develop degenerate He core while ascending the RGB. He ignition occurs explosively the helium flash. The increased core temperature causes the degeneracy to be lifted. The core expands, and He burning becomes stable. Eventually they develop degenerate C/O core before ending as white dwarf [2,10].
- Intermediate mass stars: burn He and then develop degenerate C/O cores.
- High mass stars: between 8 and  $11 M_{\odot}$  (or  $M_{\odot}$  (solar mass)), stars undergo C fusion before developing

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## DETERMINATION OF THE DYNAMIC AGE FOR THE NEBULA USING IRIS TECHNIQUE

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### ABSTRACT

The Nebulae are astronomical objects made up primarily of gaseous materials. The objects consisting of an expanding glowing shell of ionized gas ejected during the last phases of stellar evolution. In this paper the physical size of the main shell has been calculated by consider the IRIS technique. Six Nebulae are presented in this paper at different times of observations. Also the dynamic age of Nebulae are calculated and compared with the previous studies. The computed results of the physical size and dynamic age are in qualitative agreement with observations.

**KEYWORDS:** Nebulae, Stellar Evolution, Dynamic Age

### INTRODUCTION

After the last phase of stellar evolution, the short Planetary Nebula phase of stellar evolution begins as gases drift away from the centered stars (Harwood, 2013).

The central star is the remnant of its AGB progenitors, most of its hydrogen shell due to mass loss on the last phase of stellar evolution (Kwok, 2007). As the gases expand, the central star undergoes a two stage evolution, first growing hotter as it continues to contract and hydrogen fusion reaction occur in the shell around the core, in the second phase it radiates away its energy and fusion reaction cease (Kwok, 2006; Anthony, 2008). In this research the physical size of the expanding main shell of Nebulae (like PN) are calculated by using IRIS Technique with processing the images that taking by Faulkner Telescope.

The dynamic age of the Nebulae has been calculated using angular size which is measured as the method that will be indicating in this paper.

### Basic Considerations and Method

As the star evolved a long the evolution track, this star has fused all the materials and has ended its life by puffing off its outer layers. This star has left a shell of expanding gas( the Nebulae as Planetary Nebulae (PN)) and slowly cooling remnant of the stellar core called a White Dwarf (W.D) (Harwit, 2006; Gusman, 2011).

The objects imaged by the Faulkes Telescope that will be adopted are (NGC2392, NGC6543, NGC4361, NGC3242, NGC6720, NGC2440, and IC972) (Homepage PN, 2013).

The length of times the shell has been expanded can be determined by the following method steps:

- Open the image in IRIS
- Measuring the angular size of the Nebulae from the Fits images in IRIS.

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### IJAA Acceptance Letter

Dear authors,

We are glad to inform you that your manuscript:

Paper Title: DISTANCES SCALE DETERMINATION FOR A PLANETARY NEBULA  
IN GALACTIC BULGE

Paper ID 4500143

Authors Sundus A. Abdullah, Nathera A. Ali, Mohamed A. Sallih

is accepted by International Journal of Astronomy and Astrophysics (IJAA). Congratulations!!

The tentative publishing time is on March, 2013 (Vol.3 No.1).

If you have any other questions, please do not hesitate to contact as soon as possible. Thanks  
for your support to our Journal.

Best wishes

Yours sincerely,

Miao Xiong

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**Dear Dr.Sundus A.Abdullah Albakri,**

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As of April 16, 2017, we have received your review comment for paper (ID4500656) "The Solution of Optimal Two Impulse Transfer between Elliptical Orbits with Plane Change".

On behalf of Editor in Chief, I would like to thank you for your reviewing the papers for IJAA. We value the contribution you have made and hope that we will be able to ask you to review other papers for the IJAA in the future.

Best regards!

Sincerely,  
**IJAA Editorial Office**





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