
Second Arab Winter School for Astrophysics (AWSA-II)

Final Report



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AWSA



المدرسة الشتوية العربية الثانية للفيزياء الفلكية Second Arab Winter School for Astrophysics

من تنظيم - Organized by



ARAB ASTRONOMICAL SOCIETY

الجمعية العربية الفلكية

جامعة الاخوين، إفران، المغرب

Al Akhawayn University in Ifrane, Morocco

2017 نوفمبر 19 - 25
November



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شركاء في التنظيم - Co-organizers

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منظمة المجتمع العلمي العربي
Arab Scientific Community Organization





Acknowledgments

On behalf of the Arab Astronomical Society (ArAS), I would like to thank Al Akhawayn University in Ifrane (AUI) for hosting the second edition of the Arab Winter School for Astrophysics (AWSA-II). Without AUI support to our initiative, AWSA-II wouldn't have the success it has known. I also would like to thank Cadi Ayyad University for providing support to 20 Moroccan students that allowed them to participate in the school.

Special thanks go to all the institutional and individual sponsors of the school, namely, Smithsonian Astrophysical Observatory, the Oukaimeden Observatory, and all individuals who contributed through either directly or through GoFundMe fundraising platform.

It should be emphasized that both editions of AWSA could not have taken place without the contributions of all participating faculty members who devoted freely their time and energy to make these Schools a success.

My sincere gratitude and thanks go to all members of the scientific and local organizing committee of the school, particularly I would like to mention the names of some members who were deeply involved and without whom the school would never have known this success:

- Andrew Szentgyorgyi, the godfather of this school for his scientific and financial contributions.
- Ismael Moumen, who is the driving force and linchpin behind various committees tasks since the end of AWSA-I (FAWSA) until the launch of AWSA-II.
- Raid Suleiman, who provided an extraordinary substantial work for implementing the scientific program and mobilizing several stakeholders. He also played a central role in raising funds for the school.
- Hassane Darhmaoui and his LOC team in Ifrane. Hassane was one of the saviors of this edition and his organizational efficiency made this school, in addition to being instructive, very pleasant to all participants.
- Abdelhadi Jabiri, for his impeccable financial management and the work provided in completing all administrative formalities in Marrakech.
- Fouad Sefyani, for his kindness, his availability and for meeting and accompanying some of the foreign participants.
- Nasser Sqali, for volunteering to provide transportation to the participants and for his availability and services all along the school.
- Abdelmalid Benhida, Sihem Kali, Ahmed Daassou, Khalid Barkaoui, Youssef Moulane and Abdelkrim Boskri, for their participation in supervising students' work and their assistance in various tasks.
- Mohamed Chabab (director of LPHEA) and Mustapha Oulne (head of PHEAPC Master), for their administrative support.

Zouhair Benkhaldoun
ArAS President

Introduction

The Arab Winter School for Astrophysics (AWSA) is an initiative of the Arab Astronomical Society (ArAS). AWSA's objective is to give brilliant and motivated students, interested by the astronomy, the opportunity to be trained by international professional astronomers due to the lack of research in astronomy in the Arab World.

AWSA-II is endorsed by the Office of Astronomy for Development (OAD) of the International Astronomical Union (IAU). It will provide a platform for astrophysics knowledge sharing, triggering collaborations between fellow Arab astrophysicists, and building a strong professional Arab community in the field.

Based on our experience on the First Arab Winter School for Astrophysics (FAWSA), the content of AWSA-II will focus mainly on different practices and skills of professional astronomers. The scope of AWSA-II will cover the following fields:

- **Theoretical themes:** Solar Physics, Exoplanets, and Star Clusters
- **Writing a proposal:** How to write a proposal to obtain observational time in professional telescopes
- **Data/Observation:** How to get data from telescope archives and How to do professional observation for the selected themes
- **Data reduction:** How to reduce data using IRAF and Python
- **Analysis:** How to analyze photometric and spectroscopic data
- **Writing a paper:** How to present your results in a scientific paper

In this document we present the final report of the second Arab Winter School of Astrophysics (AWSA-II).

The banner for the Second Arab Winter School for Astrophysics (AWSA-II) features a cosmic background with a nebula and stars. The title is written in Arabic: "المدرسة الشتوية العربية الثانية للفيزياء الفلكية" and in English: "Second Arab Winter School for Astrophysics". Below the title, it specifies the location: "جامعة الاخوين، إفران، المغرب" and "Al Akhawayn University in Ifrane, Morocco". The dates "19 - 25 نوفمبر 2017" (November 19-25, 2017) are displayed. The organizing body is the Arab Astronomical Society (ArAS), with the website "www.ar-as.org". The banner also includes logos for various partners and co-organizers, such as the Ministry of Higher Education and Scientific Research, the Ministry of National Education, and several universities and research centers.

Context of AWSA-II preparation

Right after the end of the First Arab Winter School for Astrophysics (FAWSA), preparations for the second edition (AWSA-II) started by establishing a scientific committee and adopting a new scientific program which took into account comments and feedback raised by FAWSA students. Mainly focusing more on practical sessions rather than theory.

AWSA-II was supposed to be hosted in Jordan at first. But, unfortunately, after more than 8 months of discussions with two Jordanian colleagues, members of the Local Organizing Committee (LOC), it turned out that they could not provide the basic logistics necessary to organizing the school up to the standard set by the Scientific Organizing Committee (SOC) and ArAS. The SOC decided then, given the extremely short deadlines, to appeal again to Morocco to host the second edition. Morocco houses the headquarters of ArAS and the local researchers have good organizational experience acquired through successful organization of more than 6 international astrophysics schools in the past (the International Astrophysics Schools of Oukaimeden: OISA 2007, OISA 2009, OISA 2011, OISA 2013, OISA 2014 and FAWSA). Cadi Ayyad University, Oukaimeden Observatory, Semlalia Faculty of Sciences and Al Akhawayn University have formed the main institutional base that has made the commitment to ensure adequate logistics support for AWSA-II. Al Akhawayn University also agreed to host the school in its premises.

A new local committee was then formed to follow the various actions of local fundraising, air tickets purchase, room reservations and communication. An international fundraising call was launched and Harvard-Smithsonian Center for Astrophysics, through one of its researchers contributed to the sponsoring of the school and secured significant financial contribution. All of AWSA-II guest speakers contributed their own travel cost, some of them even contributed financially to the school and took in charge their housing expenses.

Organizing Committees

Scientific Organizing Committee (SOC)

- Raid Suleiman (SOC Chairman) : Harvard-Smithsonian Center for Astrophysics, USA
- Zouhair Benkhaldoun : Oukaimeden Observatory, Cadi Ayyad University, Morocco
- Randa Asa'd : American University of Sharjah, United Arab Emirates
- Suleiman Baraka : UNESCO Chair-holder in Astronomy, Palestine
- Andy Szentgyorgyi : Harvard-Smithsonian Center for Astrophysics, USA
- Kelly Chance : Harvard-Smithsonian Center for Astrophysics, USA
- Ismael Moumen - Université Laval/CFHT, Canada

Local Organizing Committee (LOC):

- Zouhair Benkhaldoun (LOC Chairman) : Oukaimeden Observatory, Cadi Ayyad University, Marrakech
- Hassane Darhmaoui (LOC Co-Chair) : Al Akhawayn University in Ifrane, Morocco
- Abdelmaoula Atanane : Al Akhawayn University Astronomy Club in Ifrane, Morocco
- Abderrahman Darhmaoui : Al Akhawayn University Astronomy Club in Ifrane, Morocco
- Nabila Daya : Al Akhawayn University Astronomy Club in Ifrane, Morocco
- Ghita El Bakouri : Al Akhawayn University Astronomy Club in Ifrane, Morocco
- Youssra Gaimes : Al Akhawayn University Astronomy Club in Ifrane, Morocco
- Oumaima Lamaakal : Al Akhawayn University Astronomy Club in Ifrane, Morocco
- Mohamed Chabab : LPHEA UCA, Marrakech
- Fouad Sefyani : FST FST UCA, Marrakech
- Abdelmajid Benhida : FST FST UCA, Marrakech
- Abdelhadi Jabiri : FSSM, UCA, Marrakech
- Ahmed Daassou : Observatoire Universitaire Cadi Ayyad, UCA, Marrakech
- Tarik Khalla : FSSM, UCA, Marrakech
- Meriem El Yajouri : Observatoire de Paris LESIA
- Nasser Sqali : 3AM Marrakech
- Abdelkrim Boskri : UCA, LPHEA

Scientific Program

For AWSA-II, we were able to invite and secure participation from leading international institutions to provide lectures and workshops about various topics of astrophysics to 32 students (19 females and 13 males) selected from 10 Arab countries. Below is the scientific program of AWSA-II.

	DAY 1 Sun. 19 Nov EEC-Downtown	DAY 2 Mon. 20 Nov EEC-Downtown	DAY 3 Tue. 21 Nov EEC-Downtown	DAY 4 Wed. 22 Nov EEC-Downtown	DAY 5 Thu. 23 Nov EEC-Downtown	DAY 6 Fri. 24 Nov University Campus	DAY 7 Sat. 24 Nov
	Solar Physics		Star Clusters		Exoplanet		Excursion (Fez and Region) Departure at 7:30 a.m.
08:30 – 10:15	Opening Ceremony	Data Request Proposal Raid M Suleiman Suleiman Baraka	Theory Randa A'sad	Data Reduction A. Jabiri & A. Dassou	Theory Andrew H. Szentgyorgyi	Collecting Data / Observing Zouhair Benkhaldoun	
10:15 – 10:45	Coffee Break	Coffee Break	Coffee Break	Coffee Break	Coffee Break	Coffee Break	
10:45 – 12:30	Theory - Nancy Susan Brickhouse	Collecting Data / Observing Silvio Giordano Raid M Suleiman	Instrumentations Sebastian Kamann	Data Analysis Sebastian Kamann Randa Asad	Instrumentations Andrew H. Szentgyorgyi Zouhair Benkhaldoun	Data Analysis Andrew H. Szentgyorgyi	
12:30 – 13:45	Lunch	Lunch	Lunch	Lunch	Lunch	Lunch	
14:00 – 15:30	Instrumentations – Raid M Suleiman	Data Analysis Silvio Giordano	Observing Proposal Ismael Moumen	Data Analysis (Teams) All speakers	Observation Aziz Ziad	Data Analysis (Teams) All speakers	
15:30 – 16:00	Coffee Break	Coffee Break	Coffee Break	Coffee Break	Coffee Break	Coffee Break	
16:00 – 17:00	Access to Data – Raid M Suleiman & Suleiman Baraka	Data Analysis (Teams) All speakers	Data Reduction Roger Hajjar	Data Analysis (Teams) All speakers	Data Reduction F. Sefyani & A. Benhida	Data Analysis (Teams) All speakers	
17:00 – 17:30	Review & Discussion	Review Analysis	Review & Discussion	Review Analysis	Review & Discussion	Review Analysis	
	AWSA-II Public Lectures					Closing Ceremony	
18:00 – 19:00		"Physics of Black Holes: Observational Evidence and Future Observations" Raid M Suleiman Conference Room, AUI, Build. 2	Les Ondes Gravitationnelles Zouhair Benkhaldoun AUI, Auditorium 4	فيزياء الثقوب السوداء: الأدلة الرصدية وأجهزة الرصد المستقبلية Raid M Suleiman Conference Hall, Downtown Ifrane	The Search for Evidence of Life Beyond the Solar System Andrew H. Szentgyorgyi AUI, Boardroom, Build. 1	Al Akhawayn Faculty Club Off-Campus Annexe Residence	

*Lecture ends at 12:00 to allow time for Friday prayer at 12:15

AWSA-II also offered 4 public talks in English, French, and Arabic to the community of Ifrane City. They were presented by Andy Szentgyorgyi and Raid Suleiman from Harvard - Smithsonian Center for Astrophysics and Zouhair Benkhaldoun from Cadi Ayyad University.

Opening Ceremony

The opening ceremony was presided by Prof. Zouhair Benkhaldoun, president of the Arab Astronomical Society (ArAS) and LOC-chair; Dr. Raid Suleiman, Vice-president of ArAS and SOC-chair of AWSA-II, and Dr. Hassane Darhmaoui, LOC co-chair, representing Al Akhawayn University (AUI), the hosting institution.



In the beginning, Dr. Hassane Darhmaoui first welcomed all participants in a brief address where he also presented AUI and its academic programs as well as the astronomy related activities at the university. He invited all participants to take advantage of the different facilities at the university and to actively participate in AWSA-II.

Prof. Zouhair Benkhaldoun, after welcoming all AWSA-II participants and thanking the host university, the sponsors, the invited speakers, and all members of the organizing committee, he gave a brief introduction about ArAS and its objectives. He then presented ArAS achievements as well as its short and long term projects.

In his address, Dr. Raid Suleiman warmly thanked the Moroccan ArAS members for organizing the first two editions of AWSA. He then presented a short history about the establishment of ArAS and its objectives. After presenting a brief report about the first edition of the school (FAWSA), Dr. Raid presented the program of the second edition, its overall objectives and goals.

Invited Speakers

First name	Last name	Institution	Country
Randa	Asad	American University of Sharjah	UAE
Suleiman	Baraka	Al Aqsa University	Palestine
Abdelmajid	BENHIDA	FST, Cadi Ayyad University	Morocco
Zouhair	Benkhaldoun	Oukaimeden Observatory, Cadi Ayyad University	Morocco
Nancy Susan	Brickhouse	Harvard-Smithsonian Center for Astrophysics	USA
Ahmed	Daassou	LPHEA, Cadi Ayyad University	Morocco
Silvio	Giordano	National Institute For Astrophysics (INAF)	Italy
Roger	Hajjar	Notre Dame University - Louaize	Lebanon
Abdelhadi	Jabiri	Faculty of Sciences Semlalia Marrakech	Morocco
Sebastian	Kamann	University of Göttingen	Germany
Ismael	Moumen	Université Laval/CFHT	Canada
Fouad	Sefyani	FST, Cadi Ayyad University	Morocco
Raid	Suleiman	Harvard-Smithsonian Center for Astrophysics	USA
Andrew H.	Szentgyorgyi	Harvard-Smithsonian Center for Astrophysics	USA
Aziz	Ziad	University of Nice	France



Group picture of some of the invited speakers in AWSA-II

From left to right: Dr. Fouad Sefyani, Mr. F. Sheikhani (ARESCO), Dr. Roger Hajar, Dr. Abdelmajid Benhida, Dr. Zouhair Benkhaldoun, Dr. Sebastian Kamann, Dr. Raid Suleiman, Dr. Abdelhadi Jabiri, Dr. Hassane Darhmaoui (LOC co-chair), Dr. Ahmed Daassou

Description and course of the school:

Venue: The first five days of the school were held at Al Akhawayn University Executive Education Center located in the same building where all participants resided. Meals for all participants were provided in restaurants only 5 minutes walk from the residence. This allowed convenience for all participants as well as excellent time optimization. The last day of the school was held in the beautiful campus of Al Akhawayn University.

Transportation: Local organizing committee members arranged for airport pick-up and transportation of all foreign participants either from Casablanca airport, Fez airport, or the train station in Meknes. The FST of Cadi Ayyad University in Marrakech rented a bus for the transportation of all Moroccan students from Marrakech to Ifrane.

Participants: The school had a total of 48 participants, 32 of them are students (19 females, 13 males). Five other accepted participants from some Arab countries were not able to join AWSA-II because of either some visa problems or border closure.

Training : The scientific program was designed in a way that students benefit from both the theoretical and practical aspects pertaining to all three subjects covered by the school.

Theoretical sessions:

- **Solar physics** lectures were provided by Nancy Susan Brickhouse (by videoconference), Raid M. Suleiman and Silvio Giordano.
- **Star Clusters:** lectures were provided by Randa Asa'ad (Video Recording) and Sebastian Kamann.
- **Exoplanetes:** lecture were taught by Andrew H. Szentgyorgyi and Benkhaldoun Zouhair.

Practical sessions:

- Training on proposals submission for reserving observation time to large international telescopes covered by Ismael Moumen (video recording and videoconference)
- IDL training for the reduction of Astro-Solar data and Star clusters in particular: sessions were provided by Raid M. Suleiman, Silvio Giordano, and Sebastian Karman. We appreciated the contribution of Dr. Siham Lakal who enrolled in the school as a student.
- Training on the treatment of astronomical images and their analysis including an introduction to important tools for astrophotometry and spectroscopy (IRAF, Python, Audela, ...). This part of the training was provided by Roger Hajjar, Abdelmajid Benhida, Fouad Sefyani, Ahmed Daassou. We appreciated the involvement of Khalid Barkaoui and Youssef Moulane, PhD students at the Oukaimeden Observatory of Marrakech.
- An observation of an exoplanet transit was made directly on TRAPPIST-North telescope at the Oukaimeden observatory. A demonstration of the operation of the telescope on a remote mode was presented from Liège by Emmanuel Jehin. Images of this transit were distributed to the students and were processed and analyzed during the practical sessions.

Note: Few invited speakers unfortunately were unable to join AWSA-II for different reasons, but this didn't affect the course of the training as initially programmed. All scheduled lectures and workshops were delivered as outlined in the scientific program.

Public conferences: Four general public conferences were offered in Ifrane during AWSA-II according to the following program. These conferences have drawn a large audience, especially those organized on-campus. There was an increasing interest in the subjects covered which stimulated many questions from the audience.

<p>"Physics of Black Holes: Observational Evidence and Future Observations" Raid Suleiman, Harvard-Smithsonian Center for Astrophysics, USA Monday, November 20, 2017 @ 18:00 Al Akhawayn University in Ifrane, Conference Room, Building 2</p>
<p>"Les Ondes Gravitationnelles" Zouhair Benkhaldoun, Director of the Oukaimeden Observatory, Cadi Ayyad University, Marrakech Tuesday, November 21, 2017 @ 18:00, Al Akhawayn University in Ifrane, Auditorium 4</p>
<p>فيزياء الثقوب السوداء: الأدلة الرصدية وأجهزة الرصد المستقبلية رائد سليمان، أستاذ باحث بمركز هارفارد سميثسونيان للفيزياء الفلكية، الولايات المتحدة الأمريكية يوم الأربعاء 22 نونبر 2017 على الساعة 18:00 بقاعة المناظرات، افران</p>
<p>"The Search for Evidence of Life Beyond the Solar System" Andrew Szentgyorgyi, Associate Director, Solar, Stellar and Planetary Division Harvard-Smithsonian Center for Astrophysics, USA Thursday, November 23, 2017 @ 18:00, Al Akhawayn University in Ifrane, Boardroom, Building 1</p>

The competition: Students competed to provide the best journalistic coverage of AWSA-II lectures for the benefit of the Arab Scientific Community Organization (ARESCO: <http://www.arsco.org>). The best Arabic translated coverages of the lectures were awarded during the school. A total of 23 prizes were distributed to students by a representative of ARESCO who joined AWSA-II during its last day.

Social program:

- A gala dinner with Moroccan traditional food and a local music group was organized on the last day of the school.
- A dinner was offered to the school's lecturers by the president of Al Akhawayn University, on that day Andrew Szentgyorgyi gave a successful well-attended presidential lecture at the University.
- An excursion to the imperial cities of Fes and Meknes and their historical monuments was organized at the closing day of the school.
- Several short guided visits to the university campus, the region of Ifrane, and the nearby small town “Azrou” were organized.
- Small souvenir gifts were offered by the LOC and to stakeholders and foreign participants.

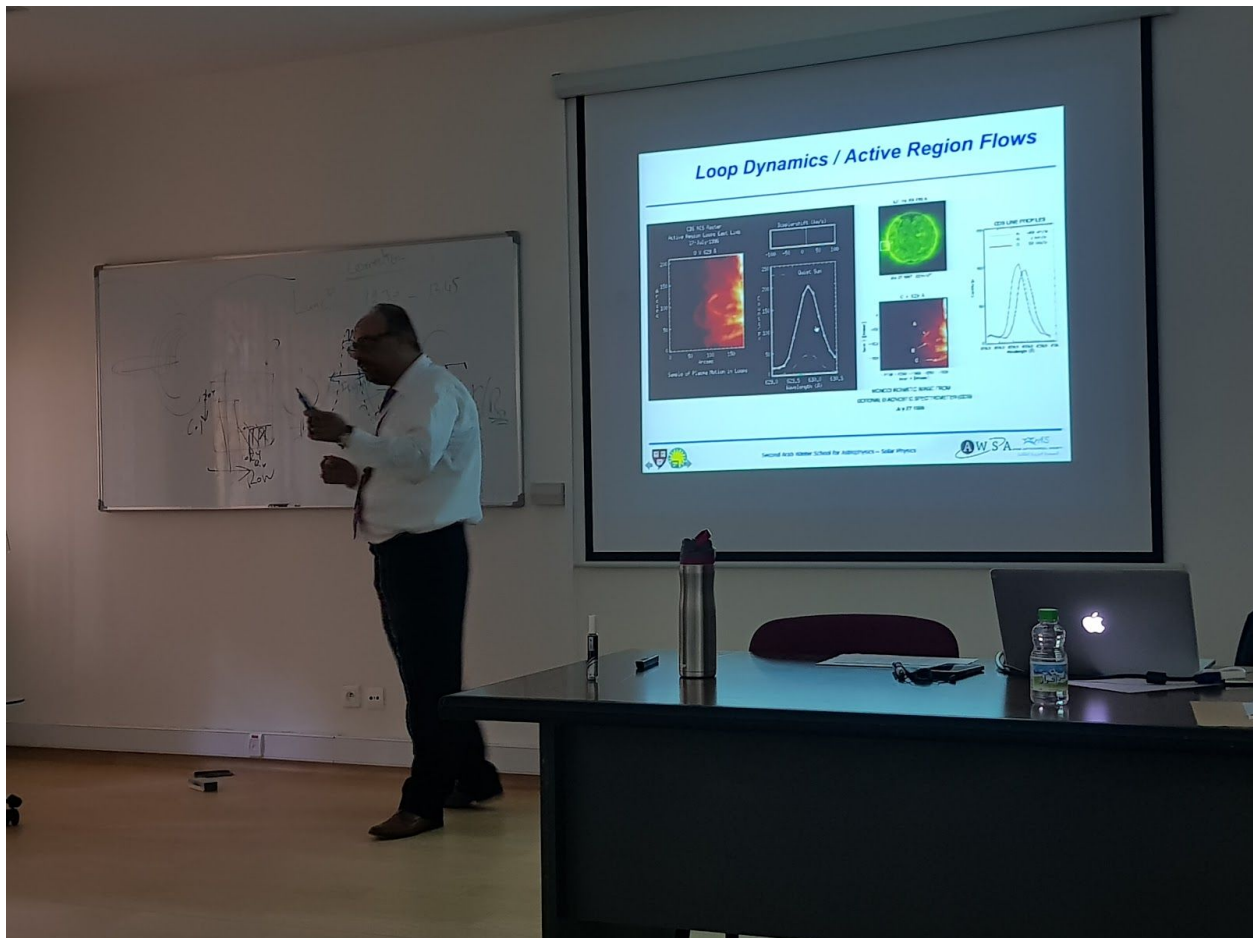


USA



Andy Szentgyorgyi, Harvard - Smithsonian Center for Astrophysics

Andy Szentgyorgyi is the Associate Director of the Solar, Stellar, and Planetary Sciences (SSP) at the Smithsonian Center for Astrophysics. He is the principal investigator of the GMT-Consortium Large Earth Finder (G-CLEF), the first light instrument for the Giant Magellan Telescope. With the G-CLEF scientific team, he is exploring the potential of G-CLEF to detect biomarkers in the atmospheres of habitable-zone exoplanets. His research interests include neutrino astronomy, very high energy gamma astronomy and X-ray astronomy. For the last two decades he has focused on optical high dispersion stellar spectroscopy with a focus on precision measurement of stellar radial velocities.



Raid M Suleiman, Harvard - Smithsonian Center for Astrophysics

Raid Suleiman astrophysicist at the Harvard-Smithsonian Center for Astrophysics (CfA), working in the Atomic and Molecular Physics Division. He is also affiliated with the Solar, Stellar, and Planetary Sciences Division.

He is responsible for SAO operational data products (BrO and OCIO) from OMI, and NO₂ from GOME-2. He is CO-I on the NASA's project TEMPO and responsible for BrO, H₂O and Level-3 data products. He is the data manager and will be responsible for managing the Instrument Operations Center (IOC) and the Science Data Processing Center (SDPC).

USA

Nancy Susan Brickhouse, Harvard - Smithsonian Center for Astrophysics

Nancy Brickhouse is a senior astrophysicist at the Smithsonian Astrophysical Observatory who specializes in studying how stars – including our Sun – behave and why. In addition to other telescopes, she uses the Chandra X-ray Observatory to investigate these questions. She is Senior Science Advisor for the Harvard-Smithsonian Center for Astrophysics. She advises the Director on major organizational issues and scientific research policy, and manages strategic planning.

Note: Nancy Susan Brickhouse was not able to travel to Morocco during AWSA-II, she gave her talk live online using skype.

Canada



Ismael Moumen, Université Laval/CFHT (picture from FAWSA)

Ismael Moumen is a PhD Student in Astrophysics under the supervision of Prof. Carmelle Robert from Laval University and Dr. Daniel Devost from Canada-France-Hawaii Telescope. He is studying

the impact of the galactic bars on the galaxy evolution using 3D spectroscopic data obtained from the first generation of the Fourier Transform Spectro-Imagers SpiOMM (installed in the Mont-Mégantic Observatory) and SITELE (installed in the Canada-France-Hawaii Telescope).

Note: Ismael Moumen was not able to travel to Morocco during AWSA-II, his talk was recorded and the discussion was followed using skype.

Germany



Sebastian Kamann - University of Göttingen, Germany

Italy



Silvio Giordano, Istituto Nazionale di Astrofisica (INAF) – Osservatorio Astrofisico di Torino, Italy

Education

1999: PhD in Physics, University of Torino, Italy (Ultraviolet Spectroscopic Observations of the Solar Corona with UVCS – Origin of the Fast Solar Wind)

1992: Laurea Degree in Physics, University of Torino, Italy (Inclusive production of n mesons with protons in the 800-150 MeV energy range on ^{12}C)

Positions

1999 -- present: Research Astrophysics, INAF – Astrophysical Observatory of Torino, Italy

2004 Visiting Scientist, Harvard-Smithsonian Center for Astrophysics, Cambridge, MA, US

1998 -- 1999: Postdoctoral Research Assistant, Astrophysical Observatory of Torino, Italy

1995 – 1998: PhD Student, Physics Department of the University of Torino, Italy,

1995 Short Term Visitor, Harvard-Smithsonian Center for Astrophysics, Cambridge, MA, US

1993 -- 1995: Fellowship, Italian Space Agency (ASI)

Projects

- UVCS/SOHO, ESA/NASA, Co-Investigator, integration, calibration, scientific operations and analysis
- SCORE/HERSCHEL (Sounding-rocket CORonagraphic Experiment), NASA/ASI, Collaborator
- EGSO (European Grid of Solar Observations), European Commission 5th FP, Co-Investigator
- OPSys (Optical Payload System Facility), ASI, Collaborator
- HELIO (Heliophysics Integrated Observatory), European Commission 7th FP, Co-Investigator
- PROBA-3/ASPIICS (Association of Spacecraft for Polarimetric and Imaging Investigation of the Corona of the Sun), ESA, Co-Investigator
- "UV Spectra of CMES: Catalog and Analysis", funded by NASA SR&T, 2005, Co-Investigator

- "Multi-ion Dynamics of the Slow Solar Wind in Coronal Streamers", funded by NSF (USA), 2011, Co-Investigator

Main Research Interests

Planning, analysis and interpretation of the solar corona observations in Ultraviolet spectral lines and in visible light.

Development of diagnostics techniques and modelling of coronal emission for study the solar wind sources and acceleration, the coronal features and transient events. Analysis, modelling and simulation of UV spectra from sungrazer comets to improve the understanding of the comet-solar wind interaction with the data obtained by SOHO mission. Co-author of more than 70 scientific papers.

Awards

Apr 1997: ESA Award for making a valuable contribution to the SOHO mission

Sep 1995: NASA Special Act Group Award for outstanding contribution to UVCS/SOHO refurbishment

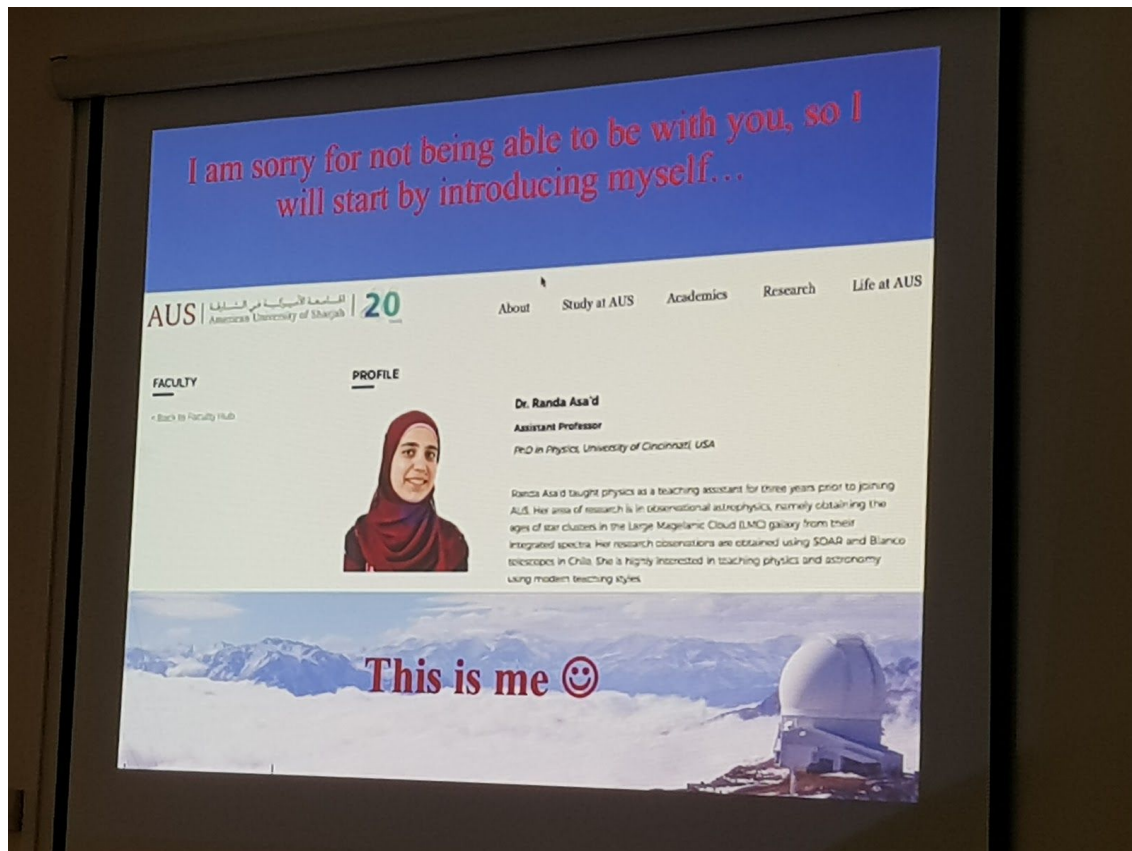
France

Aziz Ziad, Lagrange, Nice University

Prof. Aziz Ziad is the head of the "optical turbulence modeling and instrumentation" team of H. Fizeau laboratory. This team gathers know-hows in the wavefront propagation in turbulent media, atmospheric physics linking the geophysical flows to optical turbulence, site-testing experiments based on well calibrated instruments, and a great expertise in real time programming allowing to develop software packages for data acquisition & processing, simulation and modeling.

This expertise allowed this team to participate in the selection of the major sites of all the greatest projects of existing telescopes in particular of the 8-10 meter class: GranTeCan in the Canary Islands, the European VLT and Southern Gemini in Chile, Keck, Northern Gemini & Subaru in Hawaii. With a unique set of instruments to probe atmospheric turbulence, our team was also involved in the site selection for the future ELT telescopes as the 40m European E-ELT and the 30 m American TMT. Our team was also involved in the qualification of the site of Dome C in Antarctica whose future potential is considerable.

United Arab Emirates



Randa As'ad, American University of Sharjah

Randa Asa'd obtained her Ph.D from University of Cincinnati - USA in 2012 and is currently an Assistant Professor at the American University of Sharjah (AUS). She has been teaching physics and astronomy at AUS for the past 4 years. Her area of research is in observational astrophysics, namely obtaining the ages of star clusters in the Large Magellanic Cloud (LMC) galaxy from their integrated spectra. Her research observations are obtained using SOAR and Blanco telescopes in Chile. In the past 4 years she published 4 peer-reviewed papers in top astronomical journals.

Note: Randa As'ad was not able to travel to Morocco during AWSA-II, her talk was recorded and the discussion was followed using skype.

Lebanon



Roger Hajjar, Notre Dame University, Lebanon
Director, Division of Continuing Education at Notre Dame University - Louaize Associate
Professor of Physics & Astronomy
Notre Dame University - Louaize Université de Montréal, Lebanon

Experienced director of continuing education, with a strong record of academic and business development. Skilled in astronomy research, education, and outreach, and experienced public communicator. Strong skills in LaTeX, IRAF, Linux, and management in a higher education setting.

Palestine



Suleiman Baraka, AL Aqsa University, Palestine

Graduated from Université Pierre et Marie Curie, Institut d'Astrophysique de Paris in 2007. Post Doc NIA-NASA 2009. UNESCO chair-holder for Astronomy in Palestine 2012. Founder and director of Center for Astronomy and Space Sciences 2010. He works on Space modeling namely the simulation of the interaction of the solar wind and the Earth magnetosphere. His interests are in the field of Space Physics mainly to simulate the shock physics in the vicinity of the dayside magnetosphere.

Note: Unfortunately Prof. Suleiman Baraka was not able to join AWSA II because of borders closing issue in Gaza. He coordinated with Dr. Raid Suleiman on covering his lecturing sessions during AWSA-II.

Morocco



Zouhair Benkhaldoun, Oukaimeden Observatory/Cadi Ayyad University

He holds a PhD in Astrophysics from Nice Sophia Antipolis University in France and Cadi Ayyad University of Marrakech, and a Doctorate in Energetics from Marseille University in France.

In 1985, he co-founded the first research laboratory of Astrophysics in Morocco at the national center for scientific and technical research. He joined Cadi Ayyad University in Marrakech in 1992 where he co-founded the high-energy physics and astrophysics laboratory in 1999. He also worked on the establishment of the first professional astrophysics observatory in Morocco, the [Oukaimeden Observatory](#), which was inaugurated in 2007 and he served as its director since then.

His research work allowed Morocco to be selected for the E-ELT project site selection campaign. He conducted this project as part of the European FP6 program with the support of Hassan II Academy for Science and Techniques in Morocco. He is author of more than one hundred articles and scientific communications. He is currently leading an ambitious project towards a 2 meters diameter telescope in Morocco.

Prof. Benkhaldoun is also member of the research team that lately discovered the most important exoplanet system as of today (<http://www.trappist.one/>). This discovery was published in Nature magazine.

Prof. Benkhaldoun is the president of the national committee for astronomy in Morocco (CNAM) and the president of the Arab Astronomical Society ([ArAS](#)). He is also very active in the domain of science outreach. He created with a group of astronomy passionates, the Association of Amateur Astronomers of Marrakech ([3AM](#)), whose objective is to promote space sciences and solar physics to the general public. In recognition to his implication in the domain of Astronomy, the international astronomical union (IAU) named the asteroid 133892 after his name [133892 Benkhaldoun \(2004 RN8\)](#).

Morocco



Abdelhadi Jabiri, Oukaimeden Observatory/Cadi Ayyad University

Jabiri got his PhD in Astrophysics from Cadi Ayyad University in 2001. Currently, he is a professor of Physics at the Faculty of Science of Cadi Ayyad University, Marrakech. He is a member of the research team of Oukaimeden Observatory and lately has been elected president of the Association of Amateur Astronomers in Marrakech (3AM) whose objective is to promote space sciences to the general public. .

His research interests are in the following topics: site-testing, meteorology, atmospheric turbulence, planetology, and minor celestial bodies.

Morocco



Ahmed Daassou, LPHEA, Cadi Ayyad University

Ahmed Daassou PhD in astrophysics, researcher in the exoplanets field since 2009. In 2011, he became responsible for the administrative and technical affairs of Cadi Ayyad university observatory. He is also a member of the astronomy association of Marrakech (3AM) since 2010. He participated in the elaboration of various scientific projects in progress at the Oukaimeden observatory.

Morocco



Fouad Sefyani Lakrizi , Oukaimeden Observatory/Cadi Ayyad University

Sefyani Lakrizi Fouad is a Professor of stellar spectroscopy at Cadi Ayyad University. He earned his PhD from the University of Lille-I in 1994 in theoretical spectroscopy. He's an assistant professor at the Faculty of Science and Technology since 1996. He obtained his research habilitation in 2004. His current research interest focuses on the atmospheric dynamics of the variable RR Lyrae stars through their spectroscopic events.

Prof. Sefyani is a member of the physics laboratory of high energy and astrophysics (LPHEA). He is also a member of the Board of Arab Astronomical Society and member of the Astronomical Observatory of Oukaimeden. He is a board member of the Amateur Astronomy Association of Marrakech (3AM) whose objective is to promote space sciences to the general public.

Morocco



Abdelmajid Benhida, Oukaimeden Observatory/Cadi Ayyad University

He holds a PhD in Sensors and instrumentations from Montpellier University in France and Cadi Ayyad University of Marrakech, as well as a PhD in Condensed Matter / Materials Science from Montpellier University in France. Currently he is a Professor of Physics at the Faculty of Science and Technology of Cadi Ayyad University. He is member of both the LPHEA and OUCA research groups. He's currently managing the Spectro project in Oukaimeden and the underlying international cooperation.

Prof. Benhida participated in the research projects related to the qualification of astronomical sites in Morocco for the ELT telescopes (the 40m European E-ELT) from 2006 to 2009. In 2014, he coordinated the spectrophotometry project at the observatory of Oukaimeden in collaboration with the observatory of Haute Provence in France (OHP).

Prof. Benhida is an active member of the Amateur Astronomy Association of Marrakech (3AM) whose objective is to promote space sciences to the general public.

Public Conferences



PUBLIC LECTURE

Physics of Black Holes: Observational Evidence and Future Observations

Raid Suleiman
Harvard-Smithsonian Center for Astrophysics
USA

Monday, November 20, 2017 @ 18:00
Al Akhawayn University In Ifrane, Conference Room, Building 2

Public lecture offered by Al Akhawayn University to the community in the framework of the Second Arab Winter School for Astrophysics organized in Ifrane by the Arab Astronomical Society from 19th to 25th of November 2017

Co-organizers - شرعاء في التنظيم: Al Akhawayn University, MADRAKECH, INTERNATIONAL ASTRONOMICAL OBSERVATORY, CNST, PIRAN GOL (Morocco), Centre Culturel, LPHEA, Arab Astronomical Society, Académie Hassan II des Sciences & Technologie, Marrakech.

Abstract:

I will present a brief introduction to the physics of black holes, their types based on the solutions of Einstein's fields equations, and their formations. Examples of stellar and galactic black holes and their observational evidence will be discussed. Detection technique and future instruments will also be addressed. I will address some of the questions regarding the nature of the black holes.

At the end, I will introduce the Arab Astronomical Society (ArAS) and its goals and activities. I will also discuss my scientific experience and how to pursue an advanced degree in physics and Astronomy in the US.




Outline

- Black Holes – Basic Physics
- Types of Black Holes
- Black Holes Formation & Structure
- Examples of Black Holes (Cygnus X-1)
- Common Questions



PUBLIC LECTURE

**Les Ondes Gravitationnelles
(Gravitational Waves)**



Zouhair Benkhaldoun
Director of the Oukaimeden Observatory
Cadi Ayyad University
Marrakech

Tuesday, November 21, 2017 @ 18:00
Al Akhawayn University in Ifrane, Auditorium 4, Building 4

Public lecture offered by Al Akhawayn University to the community in the framework of the Second Arab Winter School for Astrophysics organized in Ifrane by the Arab Astronomical Society from 19th to 25th of November 2017

Co-organizers - شركاء في التنظيم

Partners - الشركاء



Résumé :

Il y'a un peu plus d'une année, on annonçait avec un grand fracas la découverte pour la première fois des Ondes Gravitationnelles par l'Instrument LIGO situé aux Etats Unis. Ces ondes sont apparentées à la fusion de deux trous noirs super massif. Le prix Nobel de Physique a d'ailleurs été décerné cette année (2017) aux chercheurs derrière la conception de LIGO.

Le 16 Octobre 2017, une autre découverte encore plus spectaculaire a été annoncée dans le même registre. En effet, on annonce une nouvelle fois la détection d'ondes gravitationnelles mais en plus et pour la première fois on capte l'événement source leur ayant donné naissance, la fusion de deux étoiles à neutron, par l'intermédiaire de télescopes terrestre et spatiaux opérant dans la gamme des ondes électromagnétiques. On peut donc dire que nous avons non seulement « détecté » mais au aussi « vu » la source des Ondes Gravitationnelles.

Par cet événement l'histoire donne à la fois raison à Einstein, en confirmant d'une façon éclatante sa théorie de la relativité générale et lui donne tort aussi puisqu'on rapporte qu'il pensait ne jamais pouvoir détecter ce type d'onde vu les énergie extrêmes mises en jeu pour pouvoir « déformer l'espace temps » et le faible signal qui nous parviendrait de ces événement qui ne peuvent être issue que de sources cosmiques lointaines.

La présente conférence se propose de présenter, au grand public, ces merveilleuses avancées scientifiques tout en essayant de simplifier les concepts physiques et mathématiques qui se trouvent derrière la théorie de la relativité générale.

ملخص

سأعرض مقدمة موجزة عن فيزياء الثقوب السوداء، وأنواعها انطلاقاً من حلول معادلات أينشتاين للنسبية العامة، وكيفية نشأتها. كما سأقدم أمثلة عن الثقوب السوداء النجمية والمجرية وأدلة الرصد الخاصة بها. و سأقوم بمناقشة أجهزة وتقنيات الكشف الحالية والمستقبلية. وفي الاخير سأتناول بعض الأسئلة المتعلقة بطبيعة الثقوب

محاضرة للعموم

فيزياء الثقوب السوداء:
الأدلة الرصدية وأجهزة الرصد المستقبلية

راند سليمان
أستاذ باحث بمركز هارفارد
سميثسونيان للفيزياء الفلكية
الولايات المتحدة الأمريكية

يوم الأربعاء 22 نوفمبر 2017 على الساعة 18:00
بقاعة المنظر، افان


محاضرة للعموم مقدمة من طرف جامعة الأخوين في إطار برنامج المدرسة
الشتوية العربية الثانية للفيزياء الفلكية من تنظيم الجمعية العربية الفلكية و
المقامة بجامعة الأخوين من 19 إلى 25 نوفمبر 2017

Co-organizers - شركاء في التنظيم Partners - الشركاء



PRESIDENTIAL LECTURE

The Search for Evidence of Life Beyond the Solar System



Andrew Szentgyorgyi
Associate Director, Solar, Stellar and Planetary Division
Harvard-Smithsonian Center for Astrophysics - USA

Thursday, November 23, 2017 @ 18:00
Al Akhawayn University in Ifrane, Boardroom, Building 1

Public lecture offered by Al Akhawayn University to the community in the framework of the Second Arab Winter School for Astrophysics organized in Ifrane by the Arab Astronomical Society from 19th to 25th of November 2017

Co-organizers - شركاء في التنظيم: AL AKHAWAYN UNIVERSITY, MAJMA'ACH, ASTRONOMICAL OBSERVATORY, CNRS, PIRENE GOLF (Marrakech), Centre Culturel, Arab Scientific Community Organization, Marrakech.

Partners - الشركاء: ARAB ASTRONOMICAL SOCIETY, Académie Hassan II des Sciences & Technologies.

Abstract:

In the next decade, it will be possible to search for evidence of extraterrestrial bioactivity – life on planets orbiting stars other than the Sun. This search will require the collecting power of the large ground based telescope currently being built and the new space telescopes that will be launched in the next two years. I will present an introduction to exoplanet science and how to search for evidence of life on those planets. I conclude with an introduction to the observational techniques that are we will use for these investigations and a survey if the exciting new telescopes and instruments that will make this search possible.



Workshops



Pictures of workshops and group work

The “Isaac Ibn Honayn” Arabic Translation Competition

A competition was organized for students to present the best journalistic coverage of AWSA-II lectures in Arabic language for the benefit of the Arab Scientific Community Organization (ARESCO: <http://www.arsco.org>). 23 prizes were awarded to the winning students in the presence of a representative from ARESCO.



Participants (Students)

Last name	First name	Country
DJEHA	Khedidja	Algeria
Ghazala	Lakel	Algeria
Kalli	Siham	Algeria
Aboelsoud	Reem	Egypt
El Khatheeb	Noor Falah Ahmad	Jordan
Moulane	Youssef	Morocco
ABAMNI	Sana	Morocco
AKADIR	Khadija	Morocco
ALLAOUI	Khalid	Morocco
BARKA	Aicha	Morocco
BENNANI	Mounia	Morocco
Chouqar	Jamila	Morocco
El bouyahyaoui	Khaoula	Morocco
EL FAKHIRI	Abdeladim	Morocco
GHACHOUI	Mourad	Morocco
GUENNOUN	Meryem	Morocco
Imane	Bekkal	Morocco
Oumaima	Lamaakal	Morocco
Ioutfi	Amal	Morocco
Moumene	Imane	Morocco
Shisseh	Taha	Morocco
SOUBKIOU	ABDERAHMANE	Morocco

Zinini	Mariem	Morocco
ATZEMOURT	MOSSAAB	Morocco
Chafouai	Khadija	Morocco
Mansour	Mahmoud	Palestine
Eldaw Yahya	Mohammed	Sudan
Yazidi	Mayssa	Tunisia
Talafha	Mohammed F.	United Arab Emirates

Supported students

Full financial support for 9 students from the Arab countries was available; a limited number of partial supports was also available (4 students). However, 4 students were not able to join AWSA-II for different problems.

The financial support was assigned based on the financial need and scientific merit of the candidates. In order to qualify for financial support, the applicants provided and submitted the following documents :

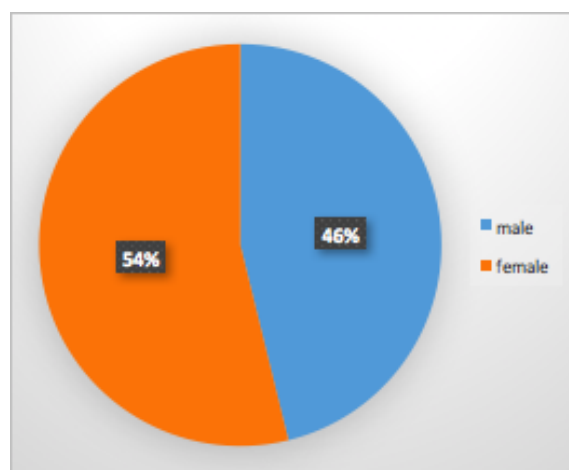
- A cover letter
- A comprehensive CV
- Two signed recommendation letters (sent directly by the person who recommends the candidates)
- A short motivation statement

List of students who were accepted for full or partial financial support:

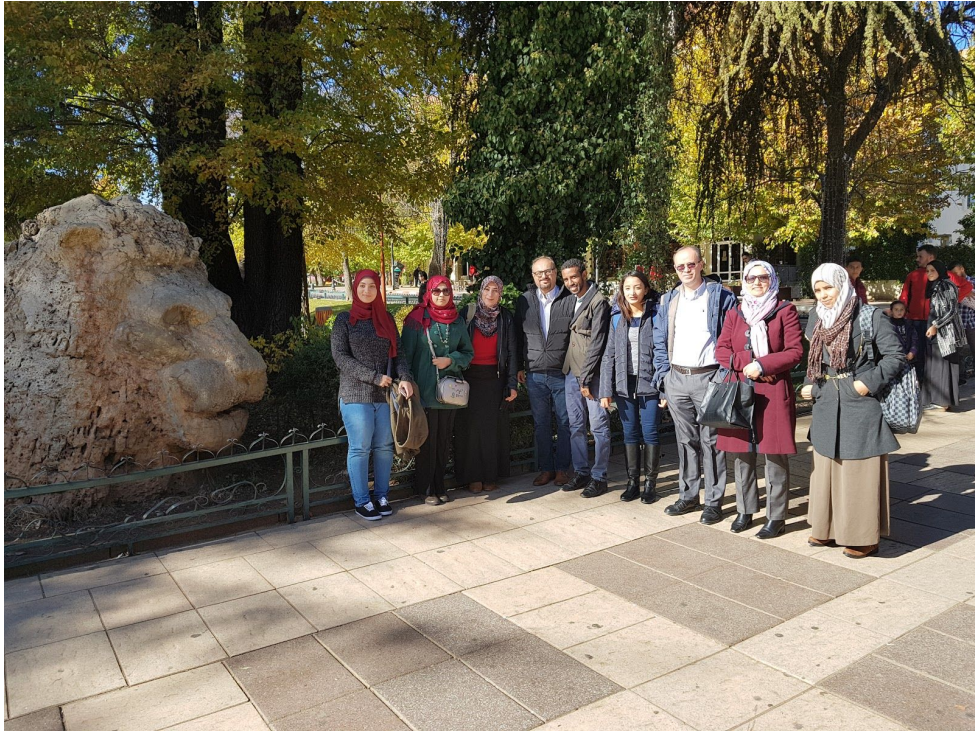
Name	Country
Reem Aboelsoud	Egypt
Khedidja Djeha	Algeria
Lakel Ghazala	Algeria
Mahmoud Mansour	Palestine
Mohamed Zoroub*	Palestine
Noor El Khatheeb	Jordan

Mayssa El Yazidi	Tunisia
Mohammed Yahya	Sudan
Youssef Moulane	Morocco
Taha Sheshe	Morocco
Mohamed Al Jady*	Koweit
Entisar Muala*	Saudi Arabia
Afnane Ostaz*	Palestine

*Students who were not able to join AWSA-II



Gender distribution of selected students with full or partial financial support



Picture of some selected students from Algeria, Tunisia, Egypt, and Sudan together with Dr. Raid Suleiman, Dr. Fuad Sefiani, and Dr. Siham Kalli



AWSA-II Students attending one of the lectures

AWSA-II Students Feedback (November 26, 2017):

- All students and everyone who spoke expressed their thanks and how much they appreciated all of the efforts behind the organization. They felt they gained a lot from the school and learned many new things.
- Each school have preferably one theme only and no more than two themes.
- Ask Ph.D. students the opportunity to give short presentation (20 minutes with 10 minutes for questions) about their research.
- Ask master students to talk about research in their countries
- Should be there to look at before the school starts, such as install all programs that needed for the school
- Detailed explanation about the programs that will be used in the school.
- The social media and WhatsApp group be the same for all schools. Meaning FAWSA, AWSA-II and the future schools have the same social media group.
- Offer those who want to prepare a poster the opportunity and have the posters displayed during the school and students can view them during coffee breaks.
- Provide in the middle of the school, like in day three, a half a day free time for the students.
- Offer a competition for translation where the prize is a NASA or CfA t-shirt.
- Teach how to prepare a poster and how to do a presentation
- Use Linux and encourage it
- Plan a course about new research like gravitational waves.
- Are there any other activities beside the school?



Gala Dinner



Gala dinner photos

Excursions (Fes, Meknes, and Region of Ifrane)





Excursions' photos

Finance:

Below is the detail of AWSA-II budget

Second Arab Winter School of Astrophysics (AWSA II)
Organized by: Arab Astronomical Society
Hosted by: Al Akhawayn university, Ifrane, Morocco
Nov. 19 – 25, 2017

FINANCIAL STATEMENT

INCOME	MAD	
Al Akawayn University	81215	
Smithsonian Institution	55800	
FSSM	32993	
Oukaimeden Observatory	3600	
Gofundme Campaign financial	17512	
Registration Fees	9421	
Arsco	8949	
Contribution to banquet and Trip	1975	
TOTAL	211465	
EXPENDITURE	MAD	
Flight Tickets	26343	
Housing	65700	
Classroom rental	13000	
Bandroles	600	
Badges	240	
Certificate+A4 posters printing	175	
Conference Bags (stylo + notebook + bag + program + brochures + small gifts (mugs) for international speakers, etc...)	1500	
Catering during School	54000	
Catering - trip to Fez	6500	
Banquet	9650	
Transportation Fees (gas, peage, train, Taxi, chauffeur, ...)	10548	
Transportation (Mini bus rental)	6000	
Gifts for Speakers	9500	
Contest Prizes and Gifts	4800	
Miscellaneous (other printing, tourist guide, sponsoring files,...)	2550	
Refund (student registration)	900	
TOTAL	212006	MAD
SURPLUS (DEFICIT)	-541	MAD

Sponsors & Partners:

شركاء في التنظيم – Co-organizers



الشركاء – Partners



Conclusion

The objective of the Second Arab Winter School for Astrophysics was to introduce young Arab researchers to the international research domains of astrophysics. The topics covered during this edition included, Solar Physics, Exoplanets, and Star Clusters. Students benefited from both the theoretical and practical aspects related to these topics.

The school was an opportunity for students to build their own scientific network both internationally and in the Arab environment. The school allowed them to freely discuss their ideas and present their projects to others. We already witnessed collaboration activities happening between some of the attendees through the various exchanges on social media platforms created by the students themselves. The woven professional relationships and bonds between peers and between students and faculty members are there to last for a bright future of astrophysics in the Arab world.

Overall AWSA-II attained its objectives through the programmed rich scientific program as well as the cultural and social activities. We are excited to launch the third edition of the school which we hope it'll be as successful as the previous two editions. The school will be called **ArAS School for Astrophysics (ArAS SfA)** to be more flexible with hosting countries that prefer to hold it during the summer.

