Final Report First GUAtemalan School of Astrophysics –GUASA2013–

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1 Short Summary of the Project

We launched the first ever GUAtemalan School of Astrophysics (GUASA). The school was held in the colonial town of Antigua Guatemala and aimed to bring together local Central American/Caribbean undergraduate students of physics/mathematics/engeneering, with experts from prestigious astronomical institutions from around the world. During its first edition the school was devouted to the topic of *EXOPLANETS* under the motto: *Finding, Characterizing and Modeling new Planets*. We believe that this school helped to motivate the students to pursue major degrees in Astronomy elsewhere. On the other hand, the school helped to consolidate a group of students who hopefully will become and create the critical mass of professional astronomers/astrophysicists in the region. As a complementary activity we also organized outreach activities for the general public. These activities were composed by public lectures, one public observation using a small telescope, an exposition of astronomical images and activities for small children. We hope that these activities have encouraged children and teenagers to get closer to science and to continue their studies aiming for higher education. For relevant photos and videos of the activity please visit this web–site: `http://fisica.usac.edu.gt/~GUASA/photos`

2 Reached Objectives

Here we list all the objectives originally proposed and below each objective, we explain how we did reach them.

1. *Introduce last year undergraduate students with top researchers from abroad.*
   This was achieved by inviting lecturers from prestigious universities and research centers from around the world. Specifically we invited Drs. Sara Seager from the the Massachusetts Institute of Technology; Dr. David Ardila, California Institute of Technology; Dr. Martin Still, NASA Ames Research Centre, Dr. Mihkel Kama, Leiden University and Dr. Silvia Torres–Peimbert from the Instituto de Astronomía at the National Autonomous University of Mexico.

2. *Allow the undergraduate students a first hand experience with professional astronomers.*
   We achieved this goal by undertaking academic and social activities.
   Academic Activities: The academic activities were composed by the courses we offered about exoplanets. We offered four courses, which were organized to give a comprehensive description about the state of the art on Exoplanet science. We provide here the lecturers name and the title of each set of lectures. **(i)** How Planets are Formed by Dr. Khama, **(ii)** Observational Evidence of Planetary Formation by Dr. Ardila, **(iii)** Detecting Planets –I by Dr. Seager and **(iv)** Detecting Planets –II by Dr. Still. All the students had to attend all the lectures.
   Social Activities: Besides the academic interaction of the students with the lecturers, we had social activities in which the students had the chance to have a closer interaction with the lecturers, these activities consisted of **(i)** coffee breaks, **(ii)** lunch every day (we asked the lecturers to sit in a different table in such a way that the students could chat with each of them), **(iii)** welcome toast, **(iv)** touristic trip and **(v)** farewell dinner. The close interaction between lecturers and students, allowed the latter to have time to ask to the professionals questions about his academic and personal life as an astronomer.

3. *Motivate and encourage undergraduate students to pursue major degrees in astrophysics.* Aiming to boost the motivation of the undergraduate students, as part of GUASA2013 we held an activity in which we asked each of the lecturers to describe their academic pathway. This was one of the most motivating activities we had because for about 2 hours, we heard the stories about how the lecturers became professional astronomers.

4. *Expose the students to an international environment (75% of the school was in English).* We kept English as the language of the school unless, Spanish was needed for organizational reasons. From all the lectures, 3 sets were given in English (Drs Khama, Seager and Still) and 1 in Spanish (Dr. Ardila). All the public activities were done in Spanish language.

5. *Involve the general public of rural Guatemala, at the place where the activity takes place with astronomy activities, specially children and teenagers, and encourage them to continue their studies and aim for high goals through education (this part will be accomplished in Spanish or if possible in a local Mayan language).*

   This goal was achieved by undertaking four different activities that included the participation of the general public of Antigua Guatemala. The activities we undertook were **(i)** Series of public lectures given by Dr. Silvia Torres–Peimbert and David Ardila. Dr. Torres–Peimbert spoke on Monday, Tuesday and Friday while Dr. Ardila gave his talk on Thursday. **(ii)**Exposition of astronomical images at the corridors of the venue. The exposition gave an "astronomical taste" to the venue during the week of GUASA2013. **(iii)** Astronomical Observation. On Friday, after 6 PM, we sat about 15 small telescopes at the main square of the venue, and we showed the stars to anyone who happened to be walking around the square. We showed the Moon and a variety of other astronomical objects. **(iv)** Finally during the morning of Saturday 14, we had an activity for small children. During this activity we helped the children to build planispheres with cardboard and white glue. The planispheres were for 20° of latitude (similar to the latitude of Guatemala which is about 15°).

3. Deviations from the original project

The only major deviations from the original project presented to the IAU were:

- Change of dates. Originally we proposed GUASA2013 to take place from December 2–6 2013 and instead, due to availability constrains in the venue, GUASA2013 happened from December 9–13 2013.

- Origin and Use of resources. As we will explain in §6, we had to implement some changes in the origin and use of resources presented to the IAU in the original

proposal. From Guatemalan institutions we only got support from two institutions which we were not expecting originally, and we did not get support from the Guatemalan National Science Fundation because of the painstaking bureaoucracy involved (see §3). However we did manage to acomplish our goals with the budget we got at the end.

3 Significant challenges encountered

Since we planned all the activity well ahead of time, we faced a few challenges regarding the GUASA2013 School. Below we enumerate the challenges we encountered and we explain how we did circumvented them.

1. *Raising local funds.* We encountered a big challenge raising local funds within Guatemala. We have tried to raise money from the local council for sciences but due to their extremely complicated bureaucreacis, we decided to decline due to the uncertainty of getting the funds in time.

2. *Raising the Interest of the local Authorities in the School/Science* We finished the GUASA School with the impression that the majority of the local authorities (private and public) did not have enough interest on it. It was only, when we started the activity and they saw the magnitude of our success, that they approached us and showed more enthusiasm. For the inauguration and for other activities such as the farewell dinner, we invited the authorities of all the major institutions that in one way or in other, supported us. However a very few of them showed up at these activities. We believe the need to improve the interest of the local authorities in science and thus this kind of activities.

3. *Recruiting Lecturers* We decided to include among our lecturers, researchers from top institutions. Although this can be very good for the school, recruiting them was a bit complicated. We believe that this was due to the fact that (i) this was the first school held in Guatemala and (ii) perhaps to the low academic image of the country abroad (No PhD/Masters programs in astrophysics/astronomy). We hope to change this image through the coming years, by showing a good selection of lecturers, through the image that the first school has given us, and by choosing always the best and most motivated students.

4 Self Evaluation

From our perspective, we believe that GUASA2013 was one of the best events of Science/Astrophysics that happened in Guatemala and in Central America during 2013 and probably also in the last few years. For us, it was inspiring, encouraging and exciting event. We believe in our previous statements because we got comments from the students and the lecturers we invited. Many of the students said that they had one of the most exciting, scientific encouraging, happiest and memorable weeks in the last years. After all the above is said, we only can conclude that GUASA2013 was a great success, and that we managed to meet all the objectives we listed in the original proposal. Below, we quote excerpts of the written comments we got from one student and one lecturer:

I found the GUASA school excellently organized, planned to the last detail, in location and in the topic and lecturers chosen. It was thought in a visionary way. The organizers were excellent hosts, Sara, David, Mitchell, Martin and Silvia are unforgettable human beings. I take this opportunity to send an email to you (the organizers) in order to thank you for taking me into account for the school GUASA2013.

Lucia Aguilar –Student

I would like to extend my gratitude for your invitation and hospitality at the First School of Guatemalan Astrophysics. I continue to be thoroughly impressed by the level of professionalism displayed by the organization team and the smooth running of the school. The enthusiasm and application of the students attending the school and the public participation in the evening activities clearly shows that there is a group of highly-driven, educated and talented young individuals within Central America whos scientific skills and industry will be of high-value to the region in future years if encouraged and nurtured. Although six weeks have passed, I continue to discuss this school with my colleagues and peers and continue to be asked about my experiences. For instance, the school was highlighted several times at the international science meeting hosted in Washington DC in January of this year. My intensely positive impressions of Guatemala as a beautiful, welcoming country, its students as individuals of high promise and work-ethic, and the success of the school in firing their imaginations and aspirations is currently being propagated across the world amongst scientists and engineers.

Dr. Martin Still –Lecturer

5 Suggestions/Recommendations to the OAD

We could not have glimpsed the level of success we achieved without the support from the institutions who believed in our project. This success is due to the high confidence that the IAU/OAD and the selection committee showed in us when we presented the proposal. In order to improve even more our success or the success of other projects of similar nature, we have the following suggestions/recommendations.

- We strongly recommend that if possible, institutions such as the IAU, should give advice to the heads of scientific funding institutions of developing countries in order to show them how to work and develop projects keeping bureaucracy to the minimum and showing them that with low budgets (∼14000,00 EUR) and a good organization it is possible to achieve events of extremely good quality.

- We recommend to keep the support towards this kind of events and scrutinize well the background and motivations of the organizers in order to maximize its impact in developing countries. Events such as GUASA2013 can be organized by a small number of motivated people and with relatively low budgets. We are glad to give any advice for similar events in other parts of the globe.

6 Financial report

We are extremely grateful for the funding support given by the IAU. Without it, GUASA2013 would have been impossible. We spent the money in the most optimized way possible in order to cover all the expenses. Below in Table 1, we show all the funding we got and in Table 2 we show all the expenses we did, all the amounts are in EUR. We used the following conversion rates: 1.00 EUR=11,00 GTQ and 1.00 EUR=1.37 US$.

Table 1: Funding sources (in EUR).

INSTITUTION	AMOUNT
International Astronomical Union	7280,00
International Centre for Theoretical Physics/UNESCO	3000,00
Universidad Francisco Marroquin	1785,00
Universidad del Valle de Guatemala	1430,00
Grand Total	**13495,00**

Table 2: Expenses Made During GUASA2013 (in EUR).

ITEM	ICTP/UNESCO	IAU GRANT	OTHER SOURCES	TOTAL COST
Accomodation	1500,80	5264,00	1466,00	8230,80
Transportation	1325,90	1706,10	1749,00	4781,00
Office		235,00		235,00
Petrol		54,00		54,00
Grand Total	**2826,70**	**7259,10**	**3215,00**	**13300,80**

As we requested in our original proposal, we have employed the IAU GRANT to cover printed matters, petrol, meals, snacks and transportation for students when it was not possible to use the ICTP/UNESCO money (Guatemalan students, and lecturers during the free day). Finally, we have used EUR 1721,90 from the IAU grant, to cover the air tickets of 3 lecturers (Martin Still, Sara Seager and David Ardila). The rest of the funds, from other sources such as Universidad del Valle and Universidad Francisco, Marroquín was used to complete the meals and accommodation of other students.

The money that is left (EUR 192,20) will be used upon aproval of the IAU/ICTP as a fund for future GUASA schools.

8. Copies of invoices/receipts

Please find the copies of all the invoices/receipts attached to this document.