

## ESO ASTRONOMY CAMP 2015 — Final Report



### 1. Concept and scope

The European Southern Observatory (ESO) and its Science Outreach Network (ESON) collaborated with the science education and communication company Sterrenlab and the Astronomical Observatory of the Autonomous Region of the Aosta Valley (OAVdA) to arrange the first ESO Astronomy Camp for European secondary school students. The camp took place from 26 December 2015 to 1 January 2016 at the OAVdA, located in Saint-Barthelemy, Nus, Italy. The location was chosen in 2013 based on its clear skies, the instruments and the didactical experience that the Observatory staff could provide.

The camp explored the theme of the Solar System and Exoplanets through lectures, hands-on activities, and night-time observations with the telescopes and instruments at the observatory. Social activities, winter sports, and excursions contributed to make the camp a memorable experience for the participants. ESO was responsible, together with Sterrenlab and OAVdA, for the scientific programme for the ESO Astronomy Camp and, together with the other partners, provided lecturers and material.

### 2. Partners

The following partners contributed to the success of the camp

by providing a total of 21 (+2 sponsoring institutions from 2014) bursaries to winning applicants:

- ESO
- Institute of Astronomy, University of Leuven: Belgium
- Instrument Centre for Danish Astrophysics, Aarhus University: Denmark

- German Astronomical Society: Germany
- National Institute of Astrophysics (INAF): Italy
- NOVA, the Netherlands Research School for Astronomy: Netherlands
- Polish Astronomical Society and Polish Children's Fund: Poland
- Ciência Viva: Portugal
- Center for the Promotion of Science: Serbia
- Spanish Astronomical Society: Spain
- Swedish Astronomical Society: Sweden
- University of Geneva: Switzerland
- Eyuboglu High School: Turkey
- Royal Astronomical Society: United Kingdom

by contributing to the scientific programme with activities and lectures and in case of the observatory instruments and facilities:

- ESO
- OAVdA (IT)
- Aarhus University (DK)
- National Institute of Astrophysics (IT)
- University of Valencia (ES)

### 3. Participants and nationalities

53 (2 registered participants could not participate because of health reasons) secondary school students (32 girls and 21 boys) aged between 16 and 18 from 21 countries participated to the ESO Astronomy Camp. In the list below, we considered the country of residence, not the nationality

Country	N
Austria	1
Belgium	3
Brazil	1
Chile	1
Denmark	5
France	1
Germany	5
Ireland	1
Italy	5
Netherlands	1
Norway	1
Poland	4
Portugal	3
Serbia	2
Slovakia	1
Spain	5
Sweden	1

Switzerland	3
Turkey	2
United Kingdom	5
United States	2

It was decided to accept a number of participants from non-ESON countries to enrich the multicultural experience.

To register, applicants were asked to upload a 3-minutes long video about the theme ‘My favourite astronomical object/phenomenon’. The entries were selected on the basis of scientific correctness, motivation, originality, diversity and willingness to engage in group activities. The registrations closed with 122 applications from 23 countries submitted. The number is significantly smaller than the number of applications in 2014 (-177) and we believe this comes from the fact that producing a video is much more demanding than writing a text. It was also noticed that the video helped to make a better selection and ensured to have a group of students, not only brilliant and motivated, but also willing to engage in group activities (scientific and social).

The selection of best entries was made by the sponsoring institutions; acceptance of the other candidates was based on fair country representation, and ranking.

#### 4. Workplan

- Preparation phase: January – May 2015
- First call: 25 May 2015
- Second call: September 2015
- Registration close: 4 October 2015
- Winners announced: 16 October 2015
- Registrations: 17 October – 30 October 2015
- Camp: 26 December 2015 – 1 January 2016

#### 5. Programme

Day	Time	Activity
Sat 26 Dec	16:00 – 18:30	Arrivals – Visit to the Observatory
	19:30	Dinner
	21:00 – 22:00	Welcome
	22:00 – 23:15	Activity: astronomical observation (Davide Cenadelli - OAVdA)
Sun 27 Dec	08:00 – 09:00	Breakfast
	09:30 – 12:00	Lecture: the solar system (Davide Cenadelli - OAVdA)
	12:30	Lunch
	14:00 – 16:30	Hiking / Snow Park
	17:30 – 19:00	Lecture: ESO and exoplanets (Tania Johnston - ESO)
	19:30	Dinner
	21:00 – 24:00	Activity: detection of an exoplanet // astronomical observations
Mon 28 Dec	08:00 – 09:00	Breakfast

	09:30 – 12:00	Lecture: minor bodies of the solar system (Albino Carbognani - OAVdA)
	12:30	Lunch
	14:00 – 16:30	Hiking / Snow Park
	17:30 – 19:30	Activity: measurement of the distance of an asteroid
	19:30	Traditional “Valdostano” dinner
	21:00 – 23:00	Lecture: biosignatures on exoplanets (Tina Santi Temki – Aarhus University)
<b>Tue 29 Dec</b>	08:00 – 09:00	Breakfast
	09:30 – 12:00	Activity: data analysis
	12:30	Lunch
	14:00 – 16:00	Activity: data analysis
	16:00 – 16:30	Lecture: the OAVdA (Enzo Bertolini – OAVdA)
	17:30 – 19:30	Activity: astronomical observation (quiz)
	19:30	Dinner
	21:00 – 23:00	Lecture: speaking with the aliens (Fernando Ballesteros – University of Valencia)
<b>Wed 30 Dec</b>	08:00 – 09:00	Breakfast
	09:30 – 12:30	Excursion to Cervinia (Matterhorn)
	12:30	(un) Lunch
	14:30 – 17:00	Excursion to Cervinia (Matterhorn)
	19:30	Dinner
	21:00 – 23:00	Preparation Star Party
<b>Thu 31 Dec</b>	06:00 – 07:30	Activity: astronomical observation
	08:00 – 09:00	Breakfast
	09:30 – 12:00	Activity: planet hunters (Anna Wolter – INAF and ESO)
	12:30	Lunch
	14:30 – 15:30	Planetarium show
	15:30 – 18:30	Presentation challenge
	19:30 – 01:00	“Cenone” and New Year’s Eve star party
<b>Fri 1 Jan</b>	06:00 – 11:00	Departures

The theme the Solar System and Exoplanets was explored with the following activities and lectures:

- Lecture: the Solar System
- Lecture: ESO and exoplanets
- Measurement: detection of an exoplanet by taking images of a transit and analysing the light curve to work out the radius of the planet, the orbital period and the major axis of the orbit
- Lecture: minor bodies of the Solar System
- Measurement: distance of an asteroid by taking images every 15 minutes and comparing them to work out the angular velocity and the orbital radius of the asteroid.
- Lecture: biosignatures on exoplanets
- Lecture: speaking with the aliens
- Activity: planet hunters citizen science platform
- Planetarium show: the Solar System

Astronomy lectures and activities were delivered by:

- Fernando Ballesteros, University of Valencia
- Andrea Bernagozzi, Astronomical Observatory of the Autonomous Region of Aosta Valley
- Enzo Bertolini, Astronomical Observatory of the Autonomous Region of Aosta Valley
- Davide Cenadelli, Astronomical Observatory of the Autonomous Region of Aosta Valley
- Albino Carbognani, Astronomical Observatory of the Autonomous Region of Aosta Valley
- Tania Johnston, European Southern Observatory
- Paolo Pellissier, Astronomical Observatory of the Autonomous Region of Aosta Valley
- Tina Santi Temki, Aarhus University
- Anna Wolter, Istituto Nazionale di Astrofisica

## 6. Promotion

The camp has been promoted through ESO's communication channels:

- ESO homepage banner, the website receiving 4 million hits per year.
- ESO web announcement
- ESO Outreach Community Newsletter, distributed to over 2500 subscribers
- National endorsing and sponsoring partners
- ESON national point of contacts
- ESO social media updates (over 70.000 members of online communities)
- ESO teachers distribution list with over 700 contacts
- Science in School magazine banner and editorial
- International Astronomical Union Outreach newsletter
- Astronomy magazine newsletter
- Hands-on-the-Universe and Galileo Teachers Programme website
- Portal to the Universe website
- ESO Astronomy camp community
- Scientix
- Planetary Society
- European Association for Astronomy Education
- Milset
- European Science Teachers association

Articles and presentations:

- C. Olivotto, et al. (2015). "Participant Perspectives on the ESO Astronomy Camp Programme", *Communicating Astronomy with the Public Journal*, 18, 33-35.
- Scicamp conference, European Conference on Science Camps and non-formal Science Education, 7 – 9 Oct 2015, Berlin (Germany)
- D. Cenadelli, et al. (2016). "Measuring the distance to the Moon with a DSLR: a high-school level experience", *Science in School*, accepted for publication

## 7. Costs

The participants' registration fee of 500 € covered 6 days full board accommodation at the hostel of Saint-Barthélemy, supervision by Sterrenlab staff, all astronomical and leisure activities, material, excursions, internal transport, transport by private bus between the observatory and the airport of Milan Malpensa and insurance. The fee and travel costs were covered by sponsoring partner institutions (19 participants), schools or local institutions (3) and participants' families (31).

Sponsoring institutions covered the cost of bursaries (500 € x N bursaries), plus in some cases travel costs to and from Milan.

## 8. Considerations and recommendation

We feel to have implemented most of the recommendations from the ESO Astronomy Camp 2013.

Major achievements 2015:

- Increase of sponsoring national partners
- Flawless and on time selection process of the sponsoring partners
- Appropriate and interesting theme
- Smaller groups for astronomical observations and reduced waiting time at the Observatory
- Support of a ESO camp alumni community

Major recommendations 2015:

- Publish clearer instructions about eligibility and selection (secondary school students, country of residence and not nationality, selection criteria)
- Fee camp and travel costs to the camp might be substantial and prevent participants from far away countries or with less financial availability to participate -> apply for Erasmus+ funding opportunities and involve more sponsoring institutions.
- Offer more co-creation and problem-solving activities where students can feel the ownership of the results
- Find synergies with other ESO educational programmes
- Collect and offer internships opportunities to ESO camp alumni

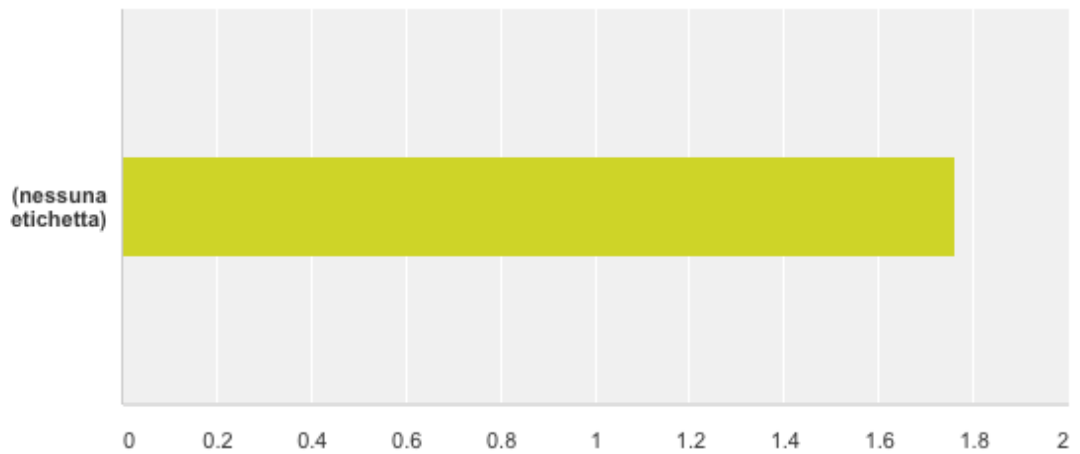
## 9. Surveys

A short anonymous questionnaire was administered to participants and their families about 2 weeks after the conclusion of the camp. The purpose of the questionnaire was to get feedbacks about period, location and programme and to identify the best communication tools to reach potential camp participants.

N. of answers 34/52

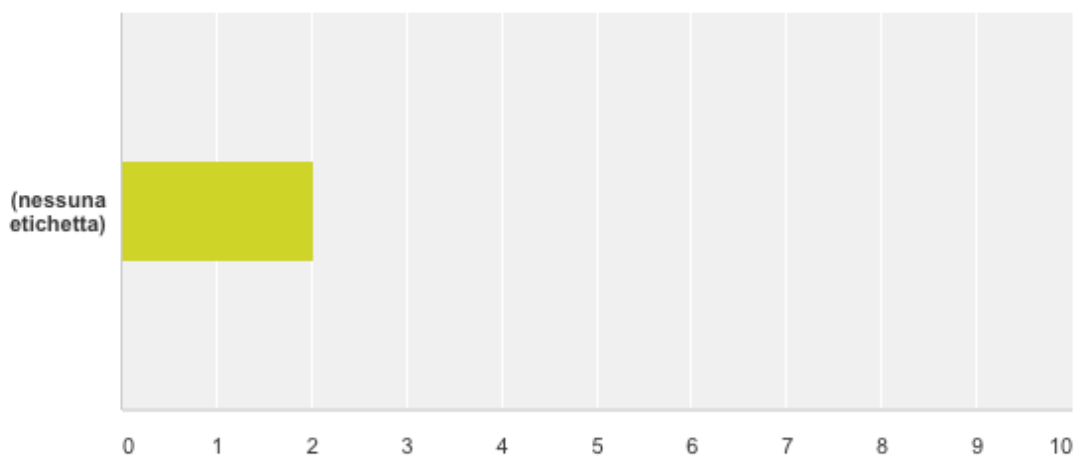
### Location and accommodation \*

Hanno risposto: 34 Hanno saltato la domanda: 0



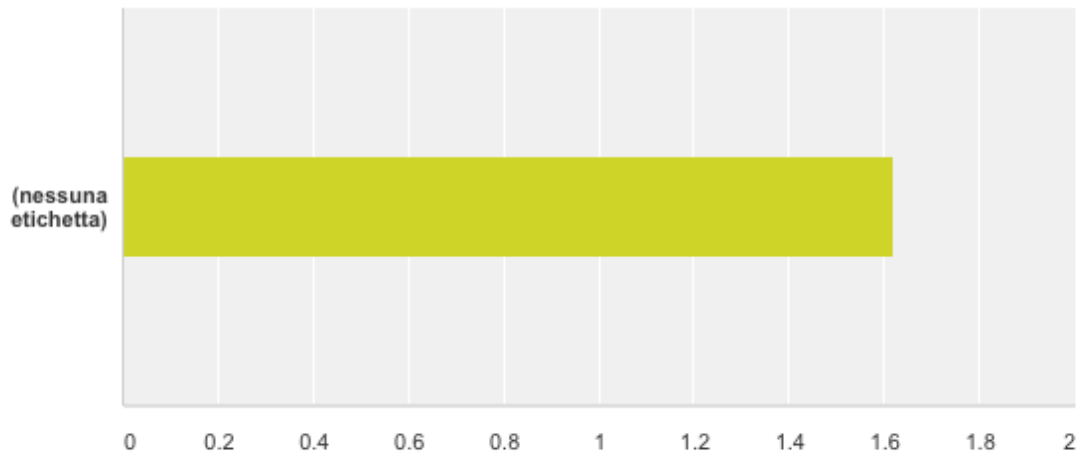
### Period (26/12 - 1/1) \*

Hanno risposto: 34 Hanno saltato la domanda: 0



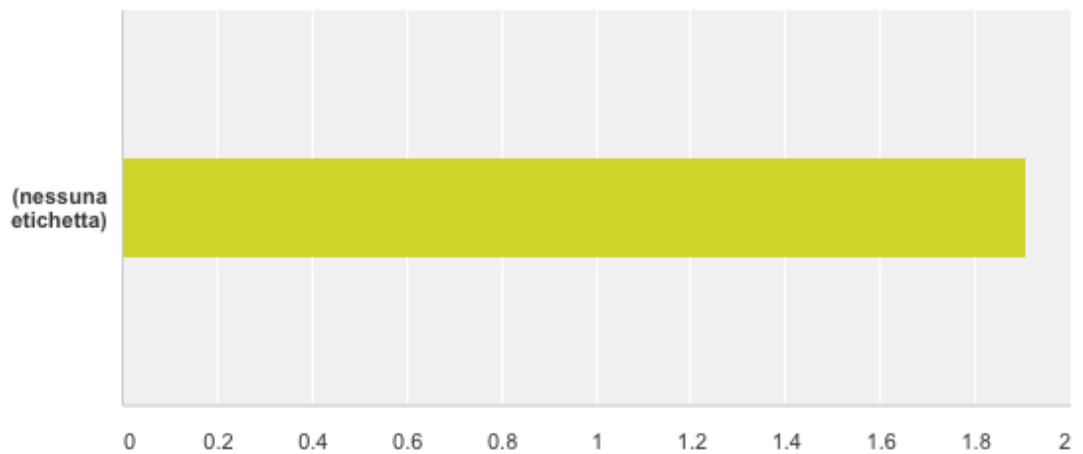
### Organisation and communication \*

Hanno risposto: 34 Hanno saltato la domanda: 0



### Value for money \*

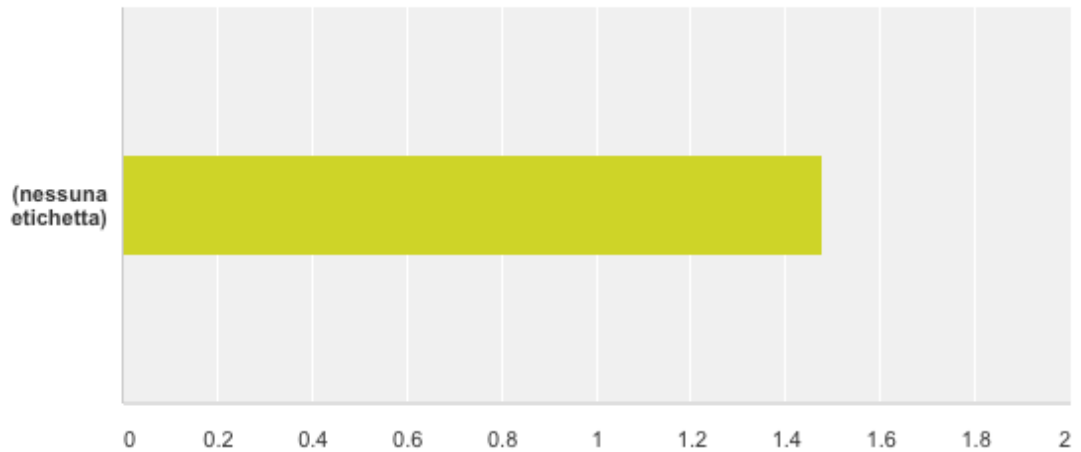
Hanno risposto: 33 Hanno saltato la domanda: 1





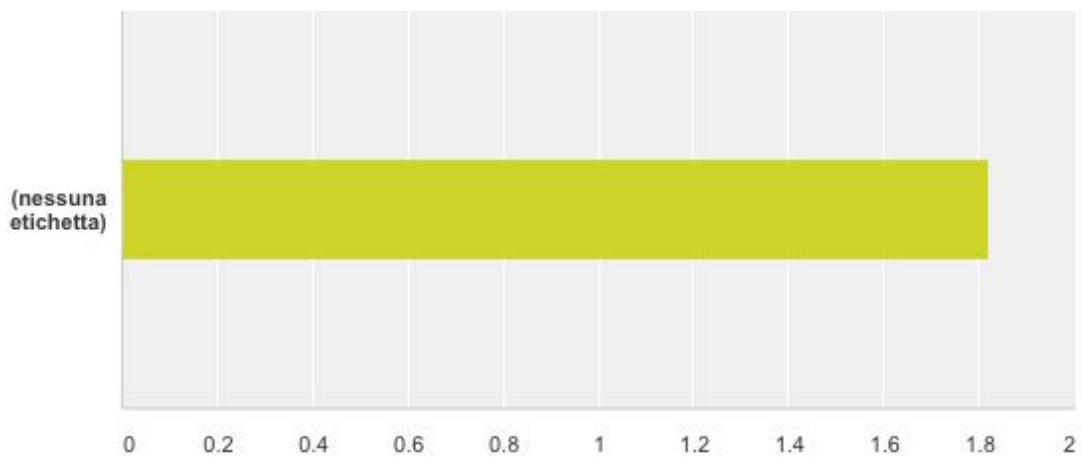
### Camp staff and visiting astronomers \*

Hanno risposto: 33 Hanno saltato la domanda: 1



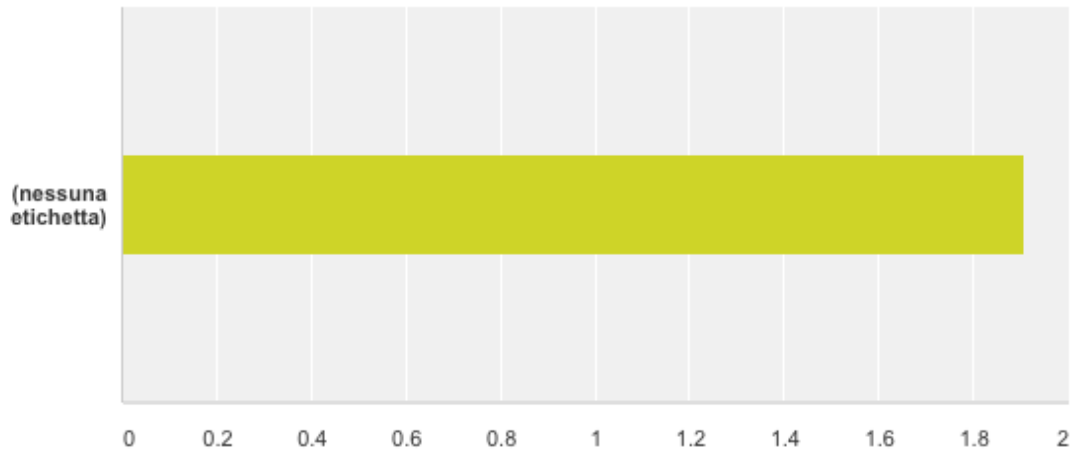
### Scientific programme \*

Hanno risposto: 34 Hanno saltato la domanda: 0



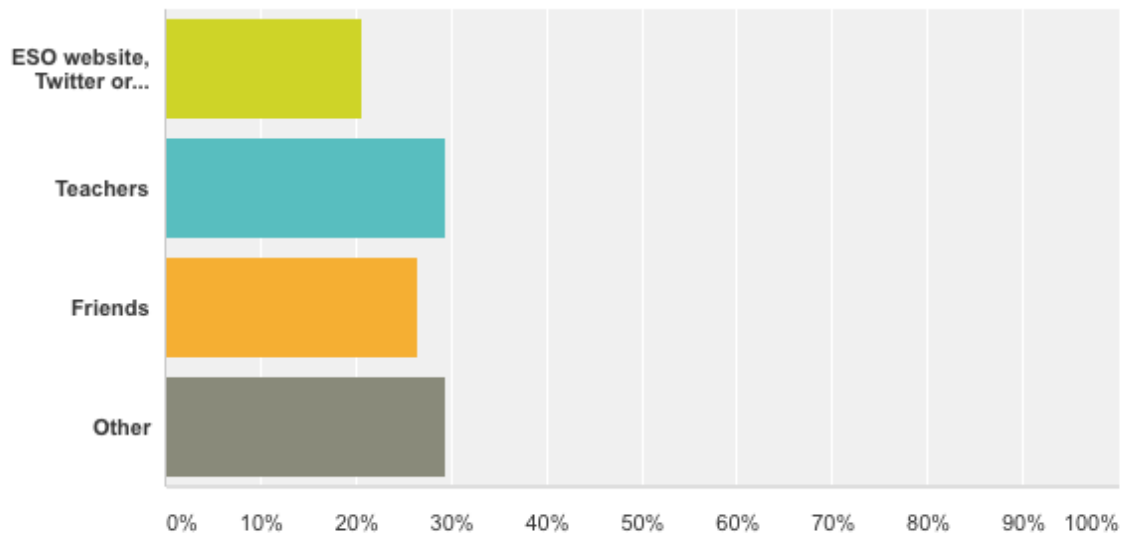
### Leisure programme \*

Hanno risposto: 34 Hanno saltato la domanda: 0



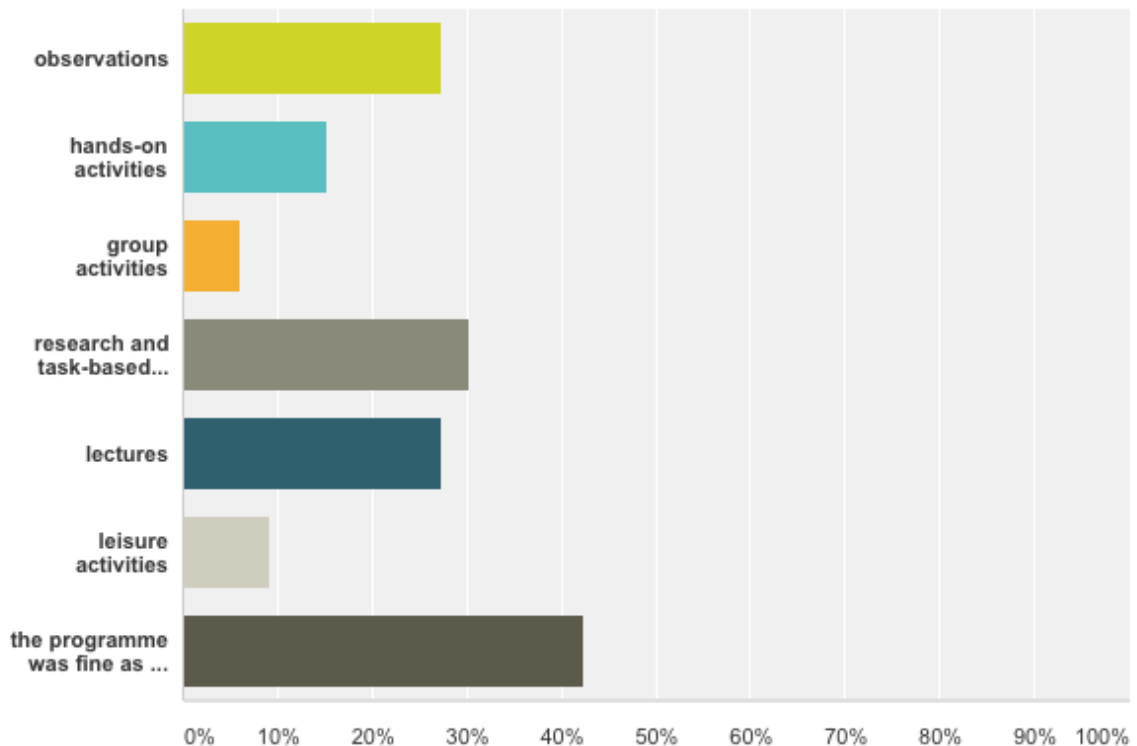
### How did you hear about the ESO camp?

Hanno risposto: 34 Hanno saltato la domanda: 0



## Would you have preferred to have more\*

Hanno risposto: 33 Hanno saltato la domanda: 1



### The 4 most voted lectures or activities

- Lecture: speaking with the aliens (I)
- Lecture: biosignatures on exoplanets (II)
- Activity: data analysis to detect exoplanets (III – ex aequo)
- Activity: naked-eye observations (III – ex aequo)

### Comments from participants:

One of the most amazing weeks in my life... I am really grateful to all the ESO staff for this beautiful experience, which enabled me to understand that stars are in my destiny...

The icebreaker activities were also very fun, as was writing nice things on NYE on the participant sheets of paper. Next year it could be cool to run more optional workshops during any long stretches of free time (like the morning planet observation that almost happened, or maybe an astrophotography workshop). Also at the start I think there was some confusion about which groups people were in, but it wasn't major :) The camp

programme was perfect as it was (thanks to Cristina, the supervisors and the scientists)... Thank you so much for an amazing week, I won't forget it!

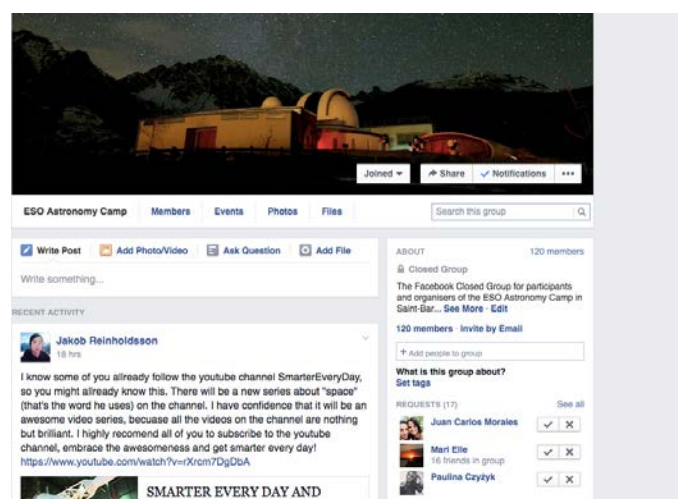
I loved it. Having so many people from different countries and cultures coming together for their interest in astronomy was amazing, and in such a beautiful place. It was truly a wonderful experience. I am very grateful I was able to be a part of it.

The camp was absolutely amazing, an unforgettable experience, thank you very much for organizing this! The only thing that I found a bit sad was the fact that the groups were almost never with other different groups (groups one-two were always together in group activities, same goes for three-four, five-six) which made it a bit more challenging to get to know everybody. But everything was amazing, thank you again!

I loved the camp, it was the most amazing week of my life, thank you for everything :D I just think that we should had more hours in observations and the lectures and activities should be with more math and not so simple. Excluding that the camp was awesome and perfect!!!!

### 10. Tumblr, Facebook and Google Drive

The purpose of the Facebook closed group “ESO Astronomy Camp” is to create a place where to get to know each other, start establishing relations between the organizers, visiting astronomers and participants – old and new -, share information, get feedbacks. The group has been used to share photo albums and information that could be relevant to the participant in a broader extent (about astronomy and/or education) and get unstructured feedbacks and impressions. The group has currently 166 members and is the hub for useful exchanges between ESO Astronomy Camp Alumni and professional astronomers; these exchanges include information about opportunities for students, competitions, best universities where to study astronomy and science/astronomy articles, videos and books. The Facebook group has the potential to become a lively community for ESO camp alumni in the future based on the fact participants have established long-term relations and are proud to have been selected to participate to a unique experience.

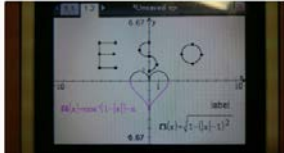



A daily account of the ESO camp experience was offered to parents and participants on Tumblr. The ESO Astronomy Camp blog was administered by Sterrenlab supervisors who posted pictures and a diary of the camp activities. The blog was meant as a communication tool for families and for the participants and therefore it is protected by password. It can be accessed at this address:

<http://esoastronomycamp2015.tumblr.com>  
 pw: esoastronomycamp2015ed

got a bit emotional at that point as we have been drinking water and tea all week. In the afternoon we had several groups that shifted between the museum that exhibits pictures of the area, shopping along the high street that counts in total 5 shops and another walk in the snow. Apparently a snow man was built as well, but I have not yet seen pictures to prove that!

After warming up with hot chocolates we all met again in the school. Divided in 6 groups, they all dedicated the evening to brainstorming for the talent show that will take place tonight after the big dinner tonight. The main theme will be astronomy of course, so anything from the stars, to the moon, planets and all the things that they have been studying this week. We are very curious to see how creative and imaginative they are. I heard some songs that in my opinion should go to Xfactor, although the ride back in the bus would of been a nice opportunity to enjoy the silence, karaoke did go on for 2 hours. This evening we will try and blog before the party gets started.  
 A New Years under the stars!

A Google Drive shared folder was created by the participants to share presentations, photos, data analysis