



Résumé du projet

250 mots maximum; ce résumé pourra être publié si le projet est sélectionné.

Currently this paragraph contains 248 of 250 allowed words.

The high-level objectives of the SELLIMA project are (1) to define [competitive science cases](#) in Astronomy, (2) to study, develop and operate a [constellation of small satellites](#) for the selected science cases and last but not least (3) to bring [university-level space engineering knowledge for Astronomy](#) to less favoured members of the global society.

Implementing the SELLIMA collaboration will not only foster cutting edge scientific knowledge, but also peace and hope via a collaboration of scientists, engineers and other professions from different socio-cultural backgrounds.

To achieve objectives (1) and (2) we will set up two working groups. The Science Working Group selects the science cases. This Working Group is supported by the Technical Working Group. The Technical Working Group defines the technical and financial boundary criteria for an Astronomy space mission based on a constellation of Nano-satellites. This group will also investigate possible synergies between Astronomy and Earth Observation satellites.

The Education Working Group focuses on objective (3). The Education Working Group defines the programme of a school for university-level students on Astronomy and Space Engineering, targeting an audience of residents in unfavourable living conditions. As a long-term objective, the Education Working Group investigates the possibility to establish an online university programme in Astronomy and Space Engineering, targeting people with limited access to regular university-level education.

Building on the outstanding heritage and the large network of expertise of the project partners we are confident to successfully set the scene for the planned follow-on activities.

Agenda du projet

dates de début/fin, événements spécifiques et étapes importantes

The project timeline assumes that the project end (PE) is 31 Dec. 2019. In case of a later, or earlier, start date we indicate also the relative timing with respect to the actual project end. We assume a duration of the project supported by this funding request of 12 months.



Relation to other calls for seed funding by the University of Geneva

Together with a group of scientists from the Hebrew University in Jerusalem we submitted in January 2017 a proposal for seed funding similar in scope to this proposal. At the time we were not selected for funding. The project evaluators found the SELLIMA project very interesting and strongly encouraged us to continue the fund seeking effort. In 2017, Re'em Sari, who represented the HUJI for our initial proposal, has taken on additional duties. Unfortunately, his new duties do not allow him anymore to commit effort to SELLIMA. To optimise and combine our efforts we then decided to not re-submit the proposal with the HUJI end of 2017 and rather submit a proposal in the scope of this current call together with the University of Grenoble and the HES-SO.

Activities prior to this proposal

It should be noted that we plan to start an extensive public awareness campaign and a fund raising exercise in 2018, i.e. before the project under this proposal is planned to start. The plan is to purchase a low-cost sailing boat and to refurbish it as a 'SELLIMA spaceship', to equip it with public outreach material and to organise roadshows for example in Switzerland, France, Palestine, Israel and other countries like India and some African countries. We will seek funding outside the scope of this proposal to realise this SELLIMA sub-project. With this approach we intend to reach a wide audience including philanthropists who find the educational and capacity building aspects of the SELLIMA project appealing and who could potentially contribute to a significant fraction of the SELLIMA budget. Depending on the success of the fund raising exercise, we will scale up or down the approach to identify possible science cases for the mission study phase. In the table below we present an approach based on the assumption that a certain level of funding will be available for the mission study phase. This will largely contribute to attract scientists and engineers to spend the effort to write a phase-1 or phase-2 proposal. The minimum effort basis would be to drop the full fledged proposal approach and to use the internal resources of the Science Working Group and the professional network of its members.

Specific activities to be covered by the seed funding

Linked to objectives (1) and (2) the specific high-level activities are:

- SCI-01: Set up a Science Working Group (SWG) to establish the possible Science Cases.



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- SCI-02: Trade and select Science Cases for the Mission Study Phase.
 - TEC-01: Set up a Technical Working Group (TWG) to support the SWG in matters of technology and financial performance parameters and constraints.
 - TEC-02: Define the boundary criteria for an Astronomy mission based on a constellation of Nano-satellites.
 - TEC-03: Investigate possible synergies between Astronomy and Earth Observation space missions.

The specific activities linked to objective (3) are:

- EDU-01: Set up an Education Working Group (EWG) to work on the activities listed below.
- EDU-02: Investigate the possibility to establish a joined bachelor and master programme in Astronomy and/or Space Engineering between universities in, for example, Switzerland, France, Israel and the Palestinian Authority.
- EDU-03: Investigate the possibility to establish an online university-level bachelor and master programme in Astronomy and/or Space Engineering.

Project Timeline

Date	Date rel. to project start	Activity (A) / Milestone (M)
01 Jan. 2019	PE - 12 m	M: Project kickoff
16 Jan. 2019	PE - 11.5 m	A: Kickoff teleconference # 01
30 Jan. 2019	PE - 11 m	A: Progress teleconference # 02
13 Feb. 2019	PE - 10.5 m	A: Progress teleconference # 03
15 Feb. 2019	PE - 10.5 m	M: Working Groups and Conference Organising Committee established
15 Feb. 2019	PE - 10.5 m	M: Collaboration platform available
13 Mar. 2019	PE - 9.5 m	A: Progress teleconference # 04
17 Apr. 2019	PE - 8.5 m	A: Progress teleconference # 05



13 - 17 May 2019	PE - 7 m	A: Workshop: Plenary part + splinters on science cases (SWG+TWG) and education programme (EWG). Preparation of Starter's Kit for phase-1 proposals. Location: Geneva
31 May 2019	PE - 7 m	M: Conference location defined
31 May 2019	PE - 7 m	M: Starter's Kit for phase-1 proposals editors available
05 Jun. 2019	PE - 6.5 m	A: Progress teleconference # 06
10 Jul. 2019	PE - 5.5 m	A: Progress teleconference # 07
31 Jul. 2019	PE - 5.5 m	M: Due date for phase-1 proposals
28 Aug. 2019	PE - 4 m	A: Progress teleconference # 08
31 Aug. 2019	PE - 4 m	M: Selection of candidates for phase-2
11 Sep. 2019	PE - 3.5 m	A: Progress teleconference # 09
25 Sep. 2019	PE - 3 m	A: Progress teleconference # 10
14 - 18 Oct 2019	PE - 2.5 m	A: Conference "Science cases and possible instruments for the SELLIMA satellite constellation".
21 - 25 Oct. 2019	PE - 2.5 m	A: Workshop on Astronomy and Space Engineering accessible to students from less favoured regions. Location: For example Jerusalem or Palestine. Note: In summer 2018, we plan to submit a separate funding proposal addressing this school to the Office of Astronomy for Development of the International Astronomical Union (IAU) in the context of their annual call . Ideally, the school will take back-to-back with the conference that we will organise in the context of this proposal.
31 Oct. 2019	PE - 2 m	M: Due date for phase-2 proposals
13 Nov. 2019	PE - 1.5 m	A: Progress teleconference # 11
29 Nov. 2019	PE - 1 m	A: Final teleconference: Kick-off preparation of project results.



31 Nov. 2019	PE - 1.5 m	M: Science case(s) for study phase selected
13 Dec. 2019	PE - 0.5 m	M: Final report available
31 Dec. 2019	PE	M: End of the project funded via this proposal

Résultats spécifiques attendus pour cette collaboration

500 mots max

Currently this paragraph contains 123 of 500 allowed words.

The expected results of the collaboration in the context of this proposal are the following:

1. Selection of the science cases for the study phase of the SELLIMA satellite constellation.
2. Identification of the scientific and engineering community to conduct the study phase for the SELLIMA satellite constellation.
3. Identification of the scientific and educational community interested in contributing to the educational objectives of the SELLIMA project, i.e. (a) the organisation of an Astronomy and Space Engineering school for young students from less favoured members of our global society and (b) the evaluation of the possibility to establish an online bachelor or master course in Astronomy or Space Engineering accessible to students from less favoured members of our global society.

Importance stratégique pour l'Alliance et valeur scientifique du projet

500 mots max

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The Department of Astronomy of the University of Geneva (historically known as the Geneva Observatory) has a long tradition and a world-recognized expertise in the development of instrumentation for astronomy and in the development and operations of ground segments for astronomy satellites (mainly in the frame of ESA). Since a few years,



the Department of Astronomy has also started to develop competences in the design and development of space-graded scientific instruments, as illustrated by recent realizations for the Astro-H (filter wheel) and Euclid (shutter).

The Institut de Planétologie et d'Astrophysique de Grenoble (IPAG) and its predecessor laboratories at the University of Grenoble have an impressive line-up of detector development especially in the domain of miniaturised high-resolution spectrographs like the SWIFT or the VIPA technologies.

The HES-SO has contributed to the successful development of SwissCube, the first Swiss satellite. SwissCube was launched in 2009. Initially conceived for a mission duration of up to one year, SwissCube is still today operated by a small group of amateur astronomers. The HES-SO also currently develops an On-Board Computer (OBC) for a commercial CubeSat to be launched this year. This indicates the potential that may be exploited by taking more risk in comparison with more traditional space mission. The HES-SO also currently develops an On-Board Computer (OBC) for a commercial CubeSat to be launched in mid-2018.

Building on this heritage, the SELLIMA project plays a vital role in consolidating the knowledge and experience gained at the Department of Astronomy at the University of Geneva via contributions to more than 5 satellite missions including for example INTEGRAL, the first satellite project we contribute to since 1995, and finally CHEOPS, the first ESA mission under Swiss leadership with a launch date end of 2018.

SELLIMA will also be instrumental to further strengthen the project partners' participation in instrument development for space missions, building upon the large body of competence that we have acquired in ground- and space-based instrumentation for astronomy.

Durabilité et viabilité du projet au-delà du financement

perspectives de financement externe - 500 mots max

Currently this paragraph contains 480 of 500 allowed words.

Based on the preliminary analysis of the project idea, we have identified the following sources for future funding.



National funding sources in Switzerland

SNF / Sinergia

Sinergia promotes the interdisciplinary collaboration of two to four research groups that propose breakthrough research. Over a period between 1 to 4 years typically CHF 200'000.- are attributed per year and research group. It is required that the consortium as a whole must have adequate experience in managing research projects, which is the case given the many successful project already carried out.

Swiss Space Office (SSO)

In 2013 and 2015 the Swiss Space Office had opened calls for ideas. We expect that similar exercises will again be conducted in the near future.

At later project phases the Prodex and the ANC programmes provide funding for space related activities.

National funding sources in France

France has many funding instruments that could be available for a project like SELLIMA. For example:

- Fonds de recherche de l'INSU
- Centre National d'Etudes Spatiales

European funding sources

Programmes under the European Space Agency (ESA)

ESA has several funding instruments that are relevant for at least parts of a project like SELLIMA. For example, the General Support Technology Programme (GSTP - <http://gstp.esa.int>) or the Innovation Triangle Initiative (ITI - <https://iti.esa.int>).

ESA Business Incubation Center Switzerland

We will also investigate to what extent we can benefit from the support and services that are offered by ESA newly created Business Incubation Center in Zurich (ESA-BIC Switzerland - <http://esabic.ch>).



International Space Science Institute (ISSI) in Bern, Switzerland

The ISSI, a joint project between the European Space Agency and Switzerland, provides opportunities for so-called Working Groups. Working Groups are set up for specific tasks, also of technical nature.

International Astronomical Union

In 2011 the IAU has set up an Office of Astronomy for Development (OAD). In 2012 the open annual Call for Proposals was launched for each of the OAD's focus areas: Universities and Research (TF1); Children and Schools (TF2); and Public Outreach (TF3). The next Call for Proposals will be announced in mid 2018: <http://www.astro4dev.org/aboutiauoad/cfp/>.

Miscellaneous funding sources

Based on the recent increase in philanthropic return to the society we will seek to be creative and gain the support of individuals or institutions. In addition, we will approach foundations and individuals active in providing financial and networking support to projects with a background in improving the lives of the less favoured members of the global community.

Seen the reception of space and astronomy related activities and even more the training activities for less favoured regions, we are confident that at least part of the final project's activities can be covered by less traditional funding sources.

We have innovative ideas to fund for example the education activities for the follow-up project. One initial idea that we would like to further develop in the scope of this seed funding is offering the observation time of the SELLIMA satellites to the scientific community and asking the successful teams for a financial contribution based on the annual gross salary of the proposer. This contribution is planned to be injected into the education activities.