The next generation mid/far-IR space missions – formulating a European perspective

!! NEW workshop DATES: 19 – 21 JANUARY 2022 !!

https://spaceir.sciencesconf.org/

In light of the recent ESA call for Medium-size (M7) and Fast (F) mission proposals the SOC has made the decision to reorient and reschedule the workshop. The workshop has now been brought forward to January, in order to discuss potential next generation mid/far-IR space missions well in advance of the ESA M7/F Phase-1 proposal deadline of 14 February 2022. The workshop is open to the global community interested in mid/far-IR space astrophysics.

The workshop will take place **as a fully online meeting** during **19 - 21 January** 2022. The SOC thanks everyone who had already saved the original dates, and we very much hope that you will be able to make the new dates. The scope of the workshop has been revised in order to make this workshop as useful a forum as possible, for potential proposers and the general community alike.

The goals of the JANUARY Workshop are as follows:

- Provide a broad overview of the key science questions that can be uniquely addressed through mid/far-IR observations
- Presentations of planned M/F missions in response to the ESA call
- Presentations of international missions and mission proposals in preparation
- Identify capabilities and limits of mid/far-IR facilities in operation (airplane observatories, balloons and ground based telescopes)

Mid/far-IR observations are crucial for addressing fundamental questions in astrophysics and (exo)planetary science, as they can uniquely unveil dust-obscured astrophysical phenomena, the main cooling mechanisms, ice composition, key atomic, ionic and molecular lines (e.g., water) and quantify the dust emission. Only with mid/far-IR observations can we fully answer many of the important astrophysical questions such as:

What are the processes that control the formation of galaxies, their clusters, stars and planetary systems? What are the physical conditions for galaxy assembly from the dawn of time? How has the chemical composition of the Universe evolved from primordial gas to habitable planets? What is the origin of the coevolution of galaxies and supermassive black holes? What processes govern the different gas phases in the ISM cycle? What is the role of the magnetic field in the evolution of the ISM and in the star and planet-formation processes? How does water trace the origin of our Solar System?

Over the past couple of decades, mid/far-IR space missions such as *ISO*, *Spitzer*, *Herschel* and *Planck* have revealed the intricate, dust-obscured interactions between stars and the interstellar medium of the Milky Way and external galaxies at all redshifts. These missions proved to be instrumental in refining our understanding of star formation as a function of cosmic time and of the role of AGNs in galaxy evolution. Ground-based and airborne submm/far-IR facilities, notably ALMA, IRAM and SOFIA, have continuously supported these quests. However, while the near-IR (< 5μm) and submm (> 800μm) wavelength ranges remain very well covered by these modern facilities and those to come on-line soon (JWST, ELT), we now need to discuss, define and propose the next generation of satellite missions in the mid/far-IR wavelength ranges.

Recognising the enormous progress that can be achieved using the mid/far-IR domain, initiatives like SPICA and the Origins Space Telescope were proposed. Unfortunately, neither of these will reach fruition as conceived, leaving a large void in our coverage of the electromagnetic spectrum for the coming decade. Indeed, both ESA's Voyage 2050 and NASA's Decadal Survey reports recognize the uniqueness of, and the need for, mid/far-IR missions to tackle the big questions in the cold and obscured universe. In this context, it is imperative to start planning the mid/far-IR space missions of the future.

The goals of the first Workshop have been updated in response to the release of the ESA call for Medium/Fast proposals (Phase-1 proposals due in February 2022; Phase-2 proposals due in July 2022). The new aim is to bring the mid/far-IR community together to discuss the science questions that we would like addressed, to be informed of the mid-/far-IR missions to be proposed, and to help them as much as possible for a successful proposal to ESA in response to the M7 (or F) call. In addition, European participation in other US/international-led proposals or concepts will also be discussed.

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