The LIFE initiative - atmospheric characterization of terrestrial exoplanets in the mid-infrared with a large space-based nulling interferometer

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LIFE collaboration

The LIFE initiative has the goal to develop the science, the technology and a roadmap for an ambitious mid-infrared nulling interferometer space mission. Such a mission will allow humankind to detect and characterize the atmospheres of hundreds of nearby extrasolar planets - including dozens that are similar to Earth - by probing the objects' thermal emission spectra. As underlined in the "Voyage 2050' recommendations from the ESA Senior Committee, the direct detection of the thermal emission of temperate terrestrial exoplanets is given very high scientific priority in ESA's future science program and is considered as a candidate theme for a future L-class mission. By now, the LIFE initiative is supported by more than 200 international colleagues from various ESA member states, the USA, Japan, and Australia, and this talk will summarize the current status of the activities. Special emphasis will be put on the unique discovery space for a large mid-infrared exoplanet mission, in particular for the detection and characterization of terrestrial exoplanets similar to Earth and Venus in the Solar System and the search for atmospheric biosignatures. Synergies between LIFE, ground-based efforts with the ELTs, and future ESA and NASA missions will be discussed and a short overview of ongoing technology developments and related challenges will be given.