The LIFE mission: a MIR space interferometer for bio- and technosignature detection

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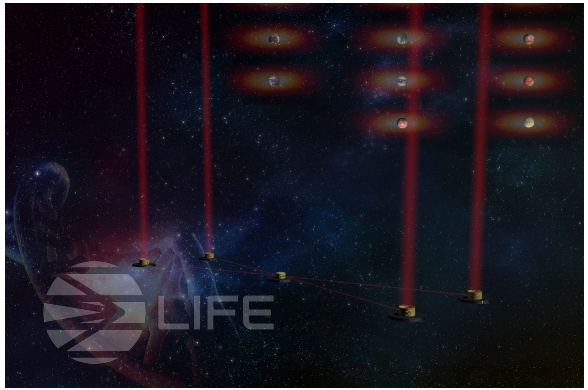
Abstract

LIFE is a project initiated in 2017 and officially kicked-off in 2018 to develop the science, technology and a roadmap for an ambitious space mission that will allow humankind for the first time to detect and characterize the atmospheres of dozens of warm, terrestrial extrasolar planets. We show how LIFE can be used for bio- and technosignature detection in statistically significant numbers that can be used to constrain the factors of the Drake equation such as the fraction of habitable planets on which life actually appears.

The **LIFE** mission and its technosignature applications

Daniel Angerhausen (ETH, BMSIS) and the LIFE team

The Mission Concept

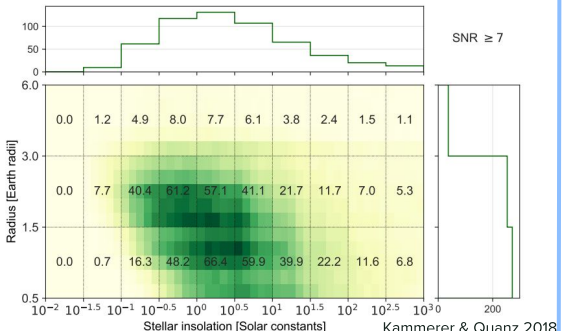


Large Interferometer For Exoplanets
a formation-flying nulling interferometer in space working at MIR wavelengths

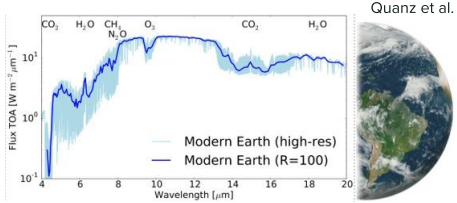
Homepage: www.life-space-mission.com/
Twitter: @LIFE_Telescope

Further reading: Quanz et al. 2019 (ESA WP) https://arxiv.org/abs/1908.01316
Quanz et al. 2018 (SPIE) https://arxiv.org/abs/1807.06088
Defrere et al. 2018 (ExAst)https://arxiv.org/abs/1801.04150

Yields and Science



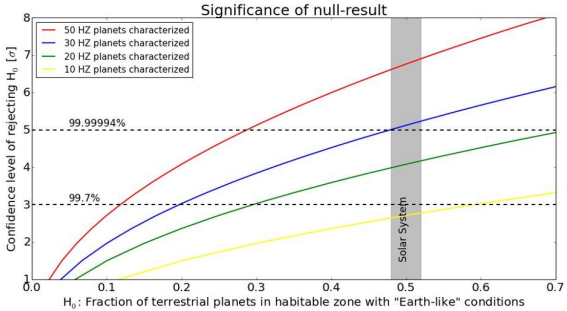
Kammerer & Quanz 2018
Quanz et al. 2018



LIFE will be able to get MIR spectra of dozens of rocky planets in the habitable zone

(0.5 $R_\oplus$ ≤ Rp ≤ 1.75 $R_\oplus$ and 200 K ≤ Teq ≤ 450 K)

Technosignatures



LIFE can search for **imprints of technology in planetary atmospheres** (e.g. CFC, PFC), which are only observable in the MIR.
LIFE will enable **comparative studies** of potentially habitable environments and constrain the fraction of habitable or even inhabited planets (i.e. **η_Hab, η_Life in the Drake Equation**). Sample size is large enough for **significant null results.**