

# Heterodyne Receivers for HIFI-Herschel and Beyond

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Astrophysical research in the far-infrared and submillimeter regime depends critically on the performance of detectors. In particular observations with high spectral resolution call for ever improved heterodyne receiver systems. Over the past decade, significant progress has been made for mixers and local oscillators in terms of sensitivity, frequency coverage, instantaneous bandwidth, and space qualification.

In our contribution, we will present test results of the Herschel-HIFI receivers and give an overview of current research into heterodyne systems for future far-infrared space missions. HIFI, the *Heterodyne Instrument for the Far-Infrared* for ESA's Herschel Space Observatory, houses seven frequency channels from 480 to 1910 GHz, which are currently being integrated and tested in the flight model. We will show the latest results for the HIFI receivers with components (like mixers, IF amplifiers and local oscillator chains) developed and built at more than 10 institutes in 7 countries.

HIFI-Herschel allows to explore the universe at high spectral resolution up to 1900 GHz. In order to open the virtually un-explored region above 2 THz to the study of star- and planet formation requiring high-resolution spectroscopy, further mixer and local oscillator development is needed. The presentation will give an outlook into future heterodyne systems ranging as high as 6 THz (50 micron) extending available technology and using new devices such as Hot-Electron-Bolometers (as mixers) and Quantum-cascade-lasers (as local oscillators).