

The FIRST-SPIRE Instrument

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SPIRE, the Spectral and Photometric Imaging Receiver, will be a bolometer instrument for ESA's FIRST satellite. Its main scientific goals and design drivers are deep extragalactic and galactic imaging surveys and spectroscopy of star-forming regions in own and nearby galaxies. The instrument comprises a three-band imaging photometer operating at 250, 350 and 500 μm , and an imaging Fourier Transform Spectrometer (FTS) covering 200-670 μm . The SPIRE detectors are feedhorn-coupled NTD spider-web bolometers cooled to 300 mK by a recyclable ^3He refrigerator. The photometer has a field of view of 4 x 8 arcminutes which is observed simultaneously in the three spectral bands. Its angular resolution is determined by the telescope diffraction limit, with FWHM beam widths of approximately 17, 24 and 35 arcseconds at 250, 350 and 500 μm , respectively. An internal beam steering mirror can be used for spatial modulation of the telescope beam, and observations can also be made by drift-scanning the telescope without chopping, providing better sensitivity for source confusion limited deep surveys. The FTS has a field of view of 2.6 arcminutes and an adjustable spectral resolution of 0.04 - 2 cm^{-1} ($\lambda/\Delta\lambda = 20 - 1000$ at 250 μm). It employs a dual-beam configuration with novel broad-band intensity beam dividers to provide high efficiency and separated output and input ports. The instrument design, operating modes, and predicted sensitivity will be described.