

## Acousto-optical spectrometers for THz heterodyne instruments

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The development of THz heterodyne receiver systems has increased the demand on spectrometers with sufficient bandwidth for real time signal processing. Furthermore the availability of large number of such spectrometers is required to serve the needs of growing image receiver projects.

Already 8 years ago KOSMA has presented a prototype of a 4 x 1 GHz acousto-optical array spectrometer which was initially developed for array receiver applications. This development was the basis for recent spectrometer systems like the wide bandwidth spectrometers (WBS) for the heterodyne instrument HIFI on board the ESA cornerstone mission Herschel and a backend system consisting of four array AOS for the GREAT instrument of the NASA-DLR airborne observatory SOFIA. Both spectrometers are designed as hybrid systems to cover up to 4 GHz bandwidth per backend with 1 MHz resolution. The complex IF processing and unavoidable platforming problems under certain observing conditions are disadvantages of every hybrid system. Therefore the use of spectrometers with larger instantaneous bandwidth will have significant advantages.

KOSMA has developed a new acousto-optical spectrometer with the largest bandwidth ever. It provides 3 GHz instantaneous bandwidth with up to 1 MHz resolution. This system is based on a new Rutil deflector and a 488 nm optically pumped semiconductor laser source. The new technology has the capability for further improvements such as an increase of bandwidth up to 4 GHz and array applications.

Keywords: THz radioastronomy; realtime spectrometers; acousto-optics; large bandwidth; hybrid systems; HIFI; GREAT; Rutil deflector

### References

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