

High Frequency High Spectral Resolution Focal Plane Arrays for ATLAST

A.M. Baryshev^{*1}, R. Hesper¹, A. Khudchenko¹, K. Rudakov^{1,2}

¹*NOVA/Kapteyn Astronomical Institute, University of Groningen, Groningen, the Netherlands*

²*Institute of Radioengineering and Electronics, Moscow, Russia*

*Contact: a.m.baryshev@astro.rug.nl

Abstract—Large collecting area single dish telescope such as ATLAST will be especially effective for medium (R~1000) and high (R~50000) spectral resolution observations. Large focal plane array is a natural solution to increase mapping speed. For medium resolution direct detectors with filter banks (KIDs) and or heterodyne technology can be employed. We will analyze performance limits of comparable KID and SIS focal plane array taking into account quantum limit and high background condition of terrestrial observing site. For large heterodyne focal plane arrays, a high current density AlN junctions open possibility of large instantaneous bandwidth >40%. This and possible multi frequency band FPSs presents a practical challenge for spatial sampling and scanning strategies. We will discuss phase array feeds as a possible solution, including a modular back-end system, which can be shared between KID and SIS based FPA. Finally we will discuss achievable sensitivities and pixel counts for a high frequency (>500 GHz) FPAs and address main technical challenges: LO distribution, wire counts, bias line multiplexing, and monolithic vs. discrete mixer component integration.