

Dual frequency ALMA operation extension

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Abstract— Atakama Large Millimeter Wave array (ALMA) is an submm interferometer which is currently being constructed in Atacama desert in Chile at altitude of 5 km. This interferometer consists of 12m diameter antennas each equipped with suite of state of art receivers covering atmospheric transmission windows in 30-950 GHz range. Design of current generation of receivers is finished and there is significant effort directed towards possible future improvement and eventual upgrade. In this contribution we would like to propose and consider in detail a possibility to operate ALMA interferometer at two frequencies/two polarizations at the same time and from the same point on the sky. This mode of operation has significant advantages, because it allows to increase available observing time twice, improve instantaneous UV-coverage, significantly improve atmospheric transparency variation correction algorithms, and obtain spectral line ratios with much higher calibration accuracy. Importantly, dual frequency operation also allows to use ALMA in a new way, by employing dual photon interferometry, which helps to acquire a short baseline spacing information and potentially allows to double spatial resolution of ALMA for suitable sources. In particular we will discuss possible implementations, and operation modes of dual ALMA band 9 (602-720 GHz)/band X receiver in more detail.