

Discovery Science with ALMA spectroscopic and imaging capabilities

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This talk presents the current and future observing capabilities of the Atacama Large sub-millimetre, Millimetre Array (ALMA). It is shown how the high level science requirements (Ability to detect spectral line emission from CO or C⁺ in a normal galaxy like the Milky Way at a redshift of $z = 3$, in less than 24 hours of observation; Ability to image the gas kinematics in a solar-mass protostellar/ protoplanetary disk at a distance of 150 pc and Ability to provide precise images at an angular resolution of 0.1") cannot be achieved by any other instrument.

These scientific goals require the instrument to have certain characteristics: High Fidelity Imaging, Routine sub-mJy Continuum / mK Spectral Sensitivity, Wideband Frequency Coverage, Wide Field Imaging Mosaicing, Submillimeter Receiver System, Full Polarization Capability, and System Flexibility.

A few first scientific results and some possible future scientific cases will be shown.