

# Submillimeter Astronomy with ALMA

Spring 2013

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This 2 credit seminar will meet once a week throughout the Spring semester. Each class will be split roughly evenly between a ~45 minute lecture on the techniques and applications of observing at submillimeter wavelengths and a ~45 minute hands-on session where we download ALMA science verification data and work through the associated tutorials on data reduction and analysis. Students will need a laptop computer running (Mac OS) unix or linux.

The goal is for students to learn the skills of submillimeter astronomy and interferometry so as to be able to propose for SMA ,ALMA, or JVLA observations in their chosen science area.

## Lecture topics

- ▶ The submillimeter sky
- ▶ Science areas: solar system
- ▶ Science areas: galactic: protoplanetary disks
- ▶ Science areas: galactic: star formation
- ▶ Science areas: extragalactic: nearby galaxies
- ▶ Science areas: extragalactic: the high redshift universe
- ▶ Detection techniques: heterodyne receivers and bolometers
- ▶ Interferometry: the two element interferometer
- ▶ Interferometry: Fourier transforms and the uv-plane
- ▶ Interferometry: inversion, deconvolution
- ▶ Interferometry: sensitivity, time estimation
- ▶ Interferometry: advanced techniques (self calibration, zero-spacing)

Course website: <http://www.ifa.hawaii.edu/users/jpw/classes/alma/>

ALMA SV data: <https://almascience.nrao.edu/alma-data/science-verification>

