

Astrophysics and Astroparticles Project

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Program: (10 hours, common lectures)

- Fundamentals of Radioastronomy (brightness and noise temperature, radiative transfer, non-thermal processes, HI 21 cm line)
- Signal processing, receivers, back-ends (autocorrelation and power spectrum, digitisation and sampling, bolometers, spectrometers)
- Fundamentals of radio-antennas (power pattern, effective aperture, antenna temperature, prime focus feeds)
- Fundamentals of Astroparticles (relativistic kinematics, cross section, interaction of particles with matter, cosmic particle sources)
- Cosmic rays (direct and indirect measurements, UHECR, East-West effect and Rossi experiment, air showers and Auger effect)
- Instruments (scintillators, photomultipliers, muon telescopes, and relative electronics)

➔ choose one project (20 hours tutored + 10 hours autonomous), work in team (2-3 people):

Project #1: observation of radio sources at 1.4 GHz with GRAD-300 + possible follow-up with IRiS

- Single dish observation methods: calibration procedures, continuum observing strategies, spectral line observations
- GRAD-300: antenna, front-end, back-end, acquisition and control software (RadioUniversePRO)
- Observations and data analysis (possible sources: Sun, Cassiopeia A (SNR), Virgo A (extragalactic), M31 rotation curve, etc.)

Project #2: observations with e-PERON and LSPM

- Observations of cosmic rays with e-PERON and muon telescope, data analysis with ROOT
- Installation of e-PERON at OHP
- Observations of neutrinos with Laboratoire Sous-marin de Provence Méditerranée (LSPM), data analysis with ROOT