

chasing the swings of the optical polarization angle of AGNs

the RoboPol project

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<http://robopol.org>



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In Brief

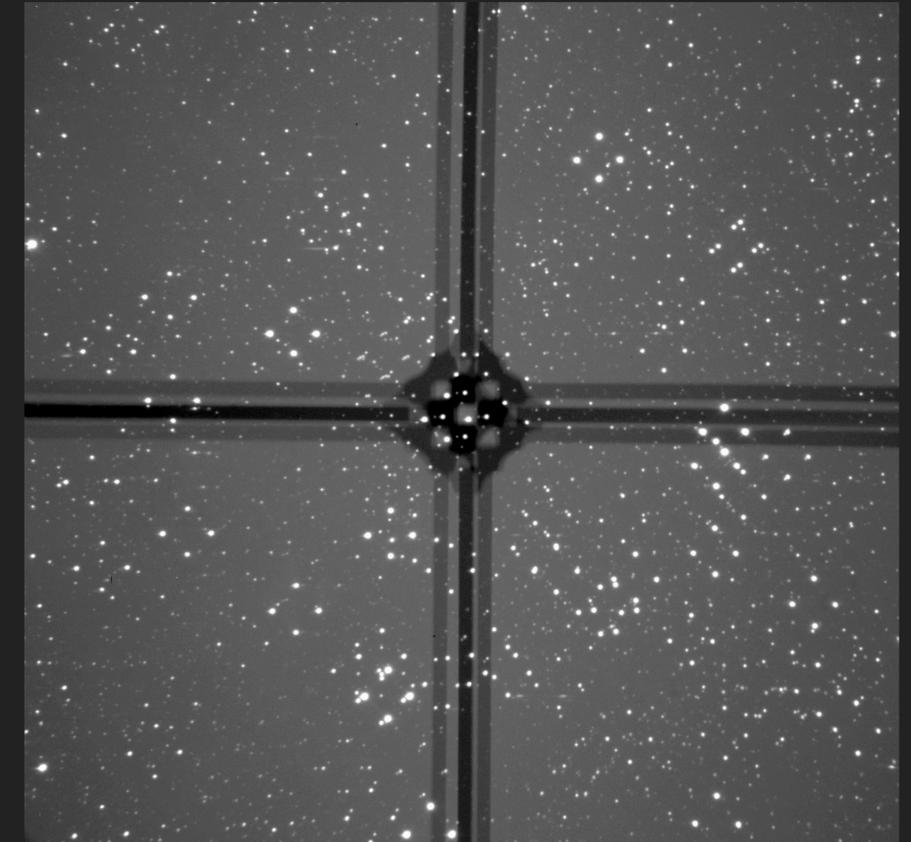
Recently there have been found cases of high energy events detected by *Fermi* and other facilities, that were associated with an almost 180-degree-angle rotation of the polarization angle of the optical jet emission (e.g. 3C279: Abdo et al, Nature 463, 2010, 919; BL Lac: Marscher et al, Nature 452, 2008, 966).

Regardless of their interpretation with the context of: *bent jet*, *helical path*, *pair-cascade scenario*, they can provide a proxy to the jet physics, composition, magnetic field topology and strength etc. They comprise a totally unexplored field of research that combined with multi-wavelength programs (e.g. F-GAMMA) can shed light to the physics of the elements of emission i.e. the clouds of relativistic particles.

In order to explore this novel field a consortium of 5 institutes set out to build, mount and operate an optical polarimeter for chasing such events on the 1.3 m Skinakas telescope (Crete, Greece).



the RoboPol instrument in the lab. Credit: O. King



Targeting BL Lac during the first night of RoboPol observations. The cross-shaped mask pattern is essential for reaching the desired sensitivity levels. Credit: O. King, A. Ramaprakash



the 1.3 m telescope at Skinakas (Crete)

Technical Details

- ▶ Novel Design with no moving parts. A combination of half-wave plates and Wollaston prisms produce four simultaneous images on the CCD from which the linear polarization Stokes parameters are directly computed.
- ▶ Robotic design: Automated online data reduction and scheduling.
- ▶ Multi-filter capability.
- ▶ High observing efficiency & automated operation.
- ▶ SNR of 10:1 in the linear polarization angle (limiting values assumed: 17 mag for 2% fractional polarization).
- ▶ Field of view: $\sim 10' \times 10'$.
- ▶ Dynamic scheduling.
- ▶ Median seeing: 0.7 arcsec.
- ▶ Observing season: March - November.

Science Facts

- ▶ Candidates drawn from a gamma-ray flux limited sub-set of the 2FGL catalog of 557 source with gamma-ray variability index 41.64.
- ▶ A gamma-quiet "control sample" of radio variable sources is used for comparison and population studies.
- ▶ A sample of 100 sources will be repeated every ~ 3 nights. Twice as large a sample as that of currently existing programs.
- ▶ Active sources will be subjected to faster cadences.
- ▶ Time baselines of roughly one month on either side of the polarization rotator event is aimed.

➔ First Light: May 15, 2013

