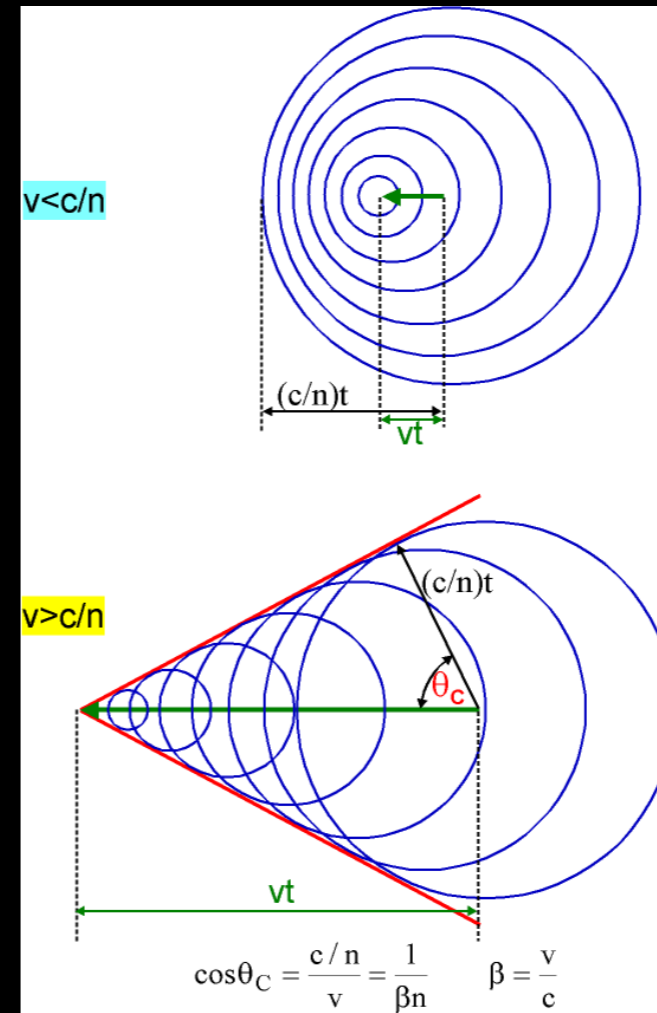
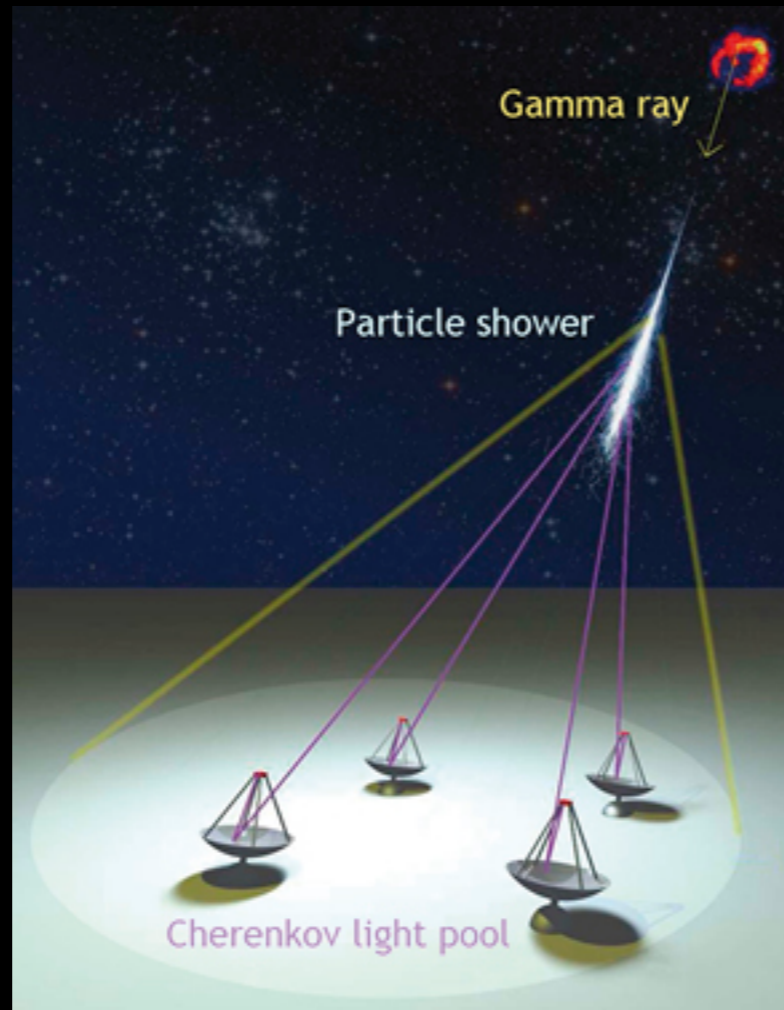


# TNG (and La Palma) as a workhorse for the CTA



*Stefano Covino, Giacomo Bonnoli, et al.*

# Cherenkov Astronomy



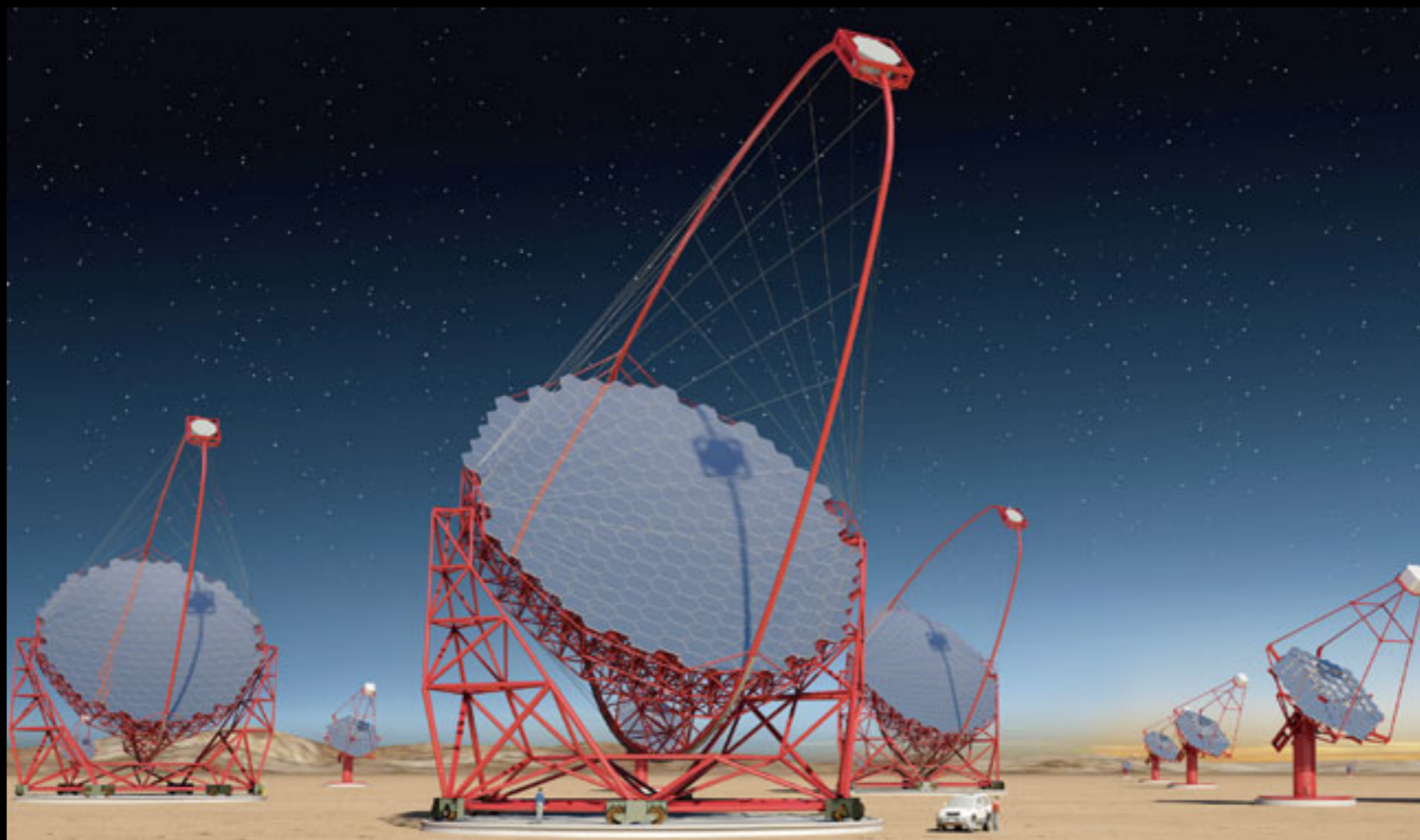
- Observation techniques under active development since a few decades
- No more an experimental tool, it is now a mature research field
- INAF is heavily involved with technology and science

# MAGIC, ASTRI —> CTA



- A few astronomers, part of the mirrors (and know-how), and (occasionally?) TNG staff for maintenance
- The ASTRI telescope is based on the MAGIC heritage and is proposed to be part of the future CTA
- Relevant scientific output (~15 paper/year, and on average a ~40 citations each)

# CTA North & South



- One of the main INAF ground projects for the next decade
- An ambitious project managed as a real observatory (proposals, GO time, etc.)
- Operational in 2020 (?)

# Science cases

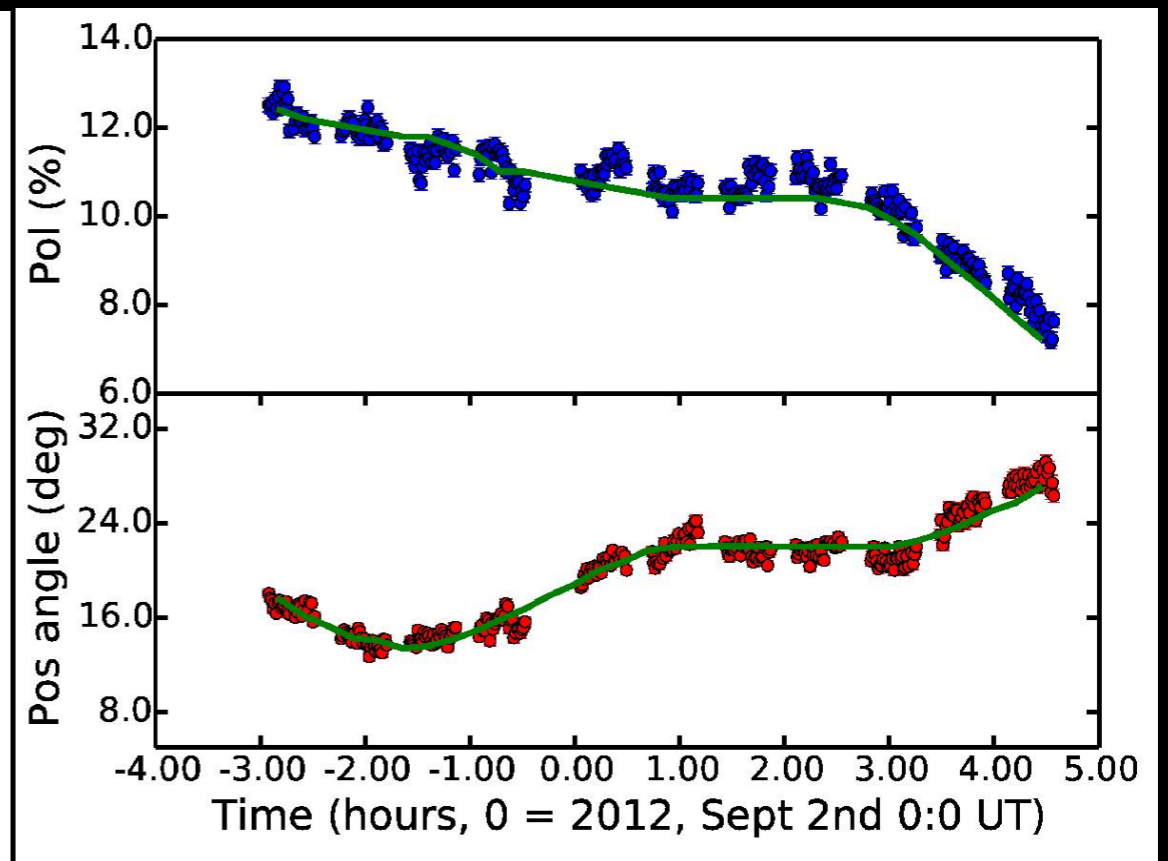
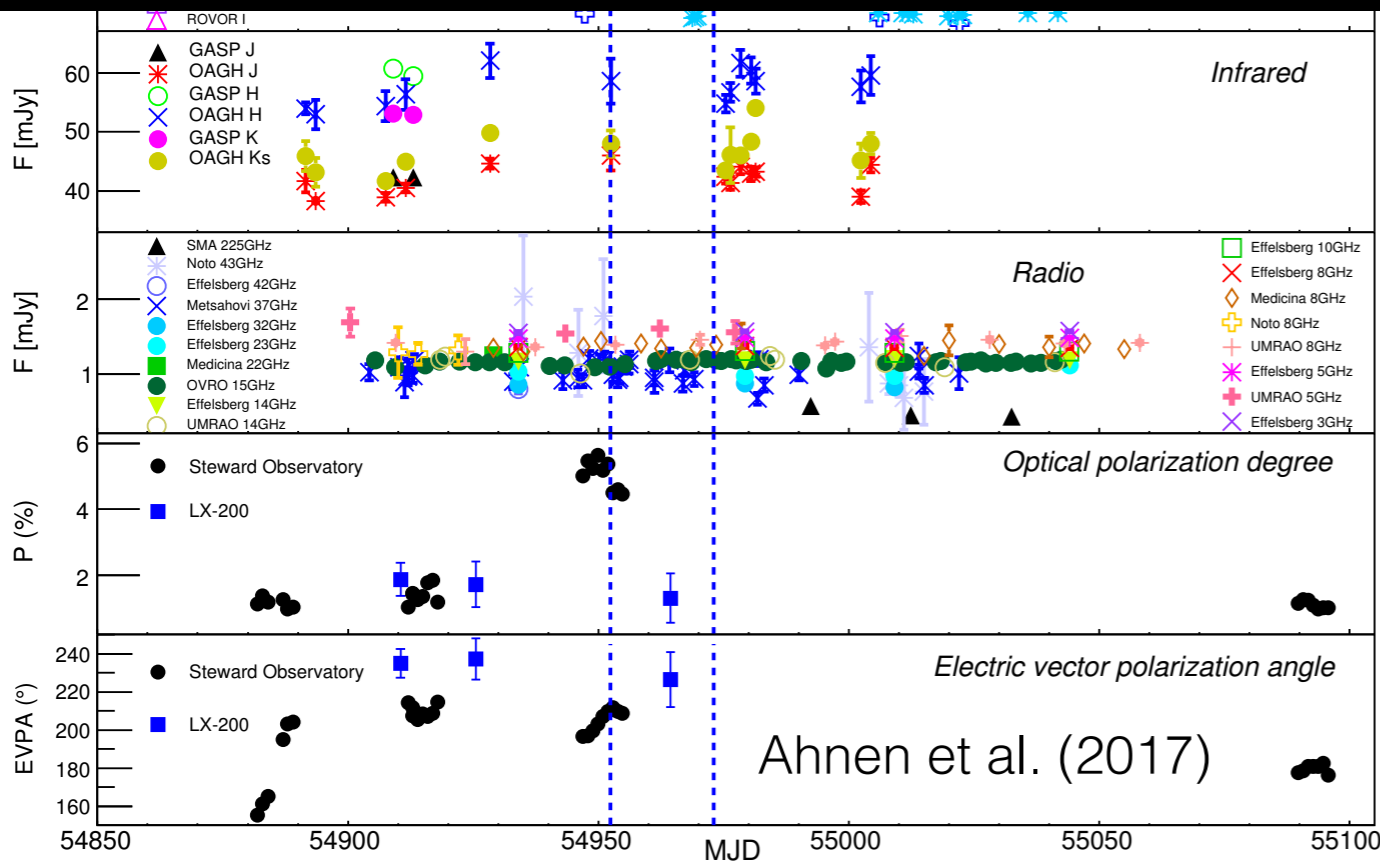
- Not surprisingly, VHE science shows most of the hot keywords for any proposal: time-domain, multi-messenger, multi-wavelength.
- There are, of course, science cases “self-contained”, i.e. where VHE observations provide the solution by themselves.
- Many other cases unavoidably require multi-wavelength, often time-resolved, campaigns to profitably exploit the VHE data.



- And this is why the TNG can play a remarkable role!
- Geographic proximity to the CTA North site is an added value
- 4m-class is just what it is needed.

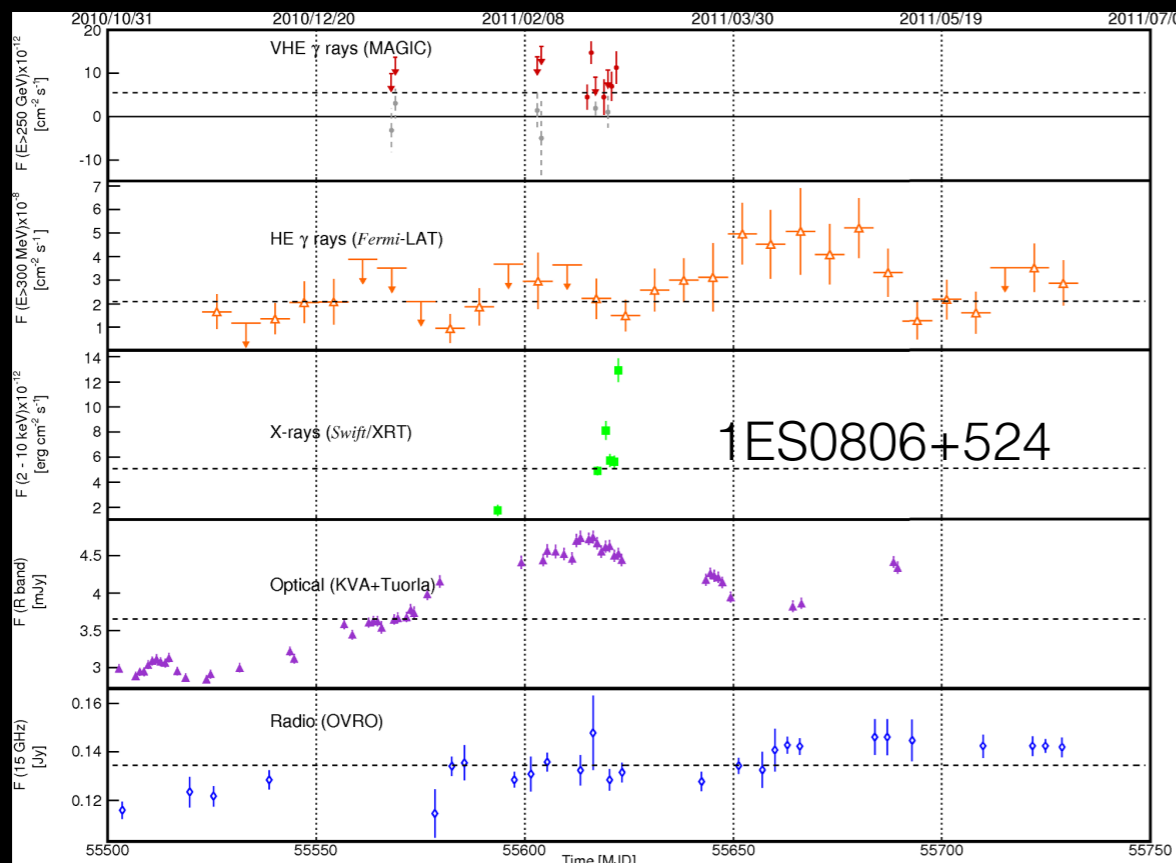
# Science cases: polarimetry

- Although with a large variety of different scenarios and environments, high-energy astrophysics often involves particle acceleration.
- **Polarimetry is a main diagnostic tool.**
- Depending on the specific case sporadic or intense monitoring is required. In the latter case, or for faint sources, a large collecting area is needed.

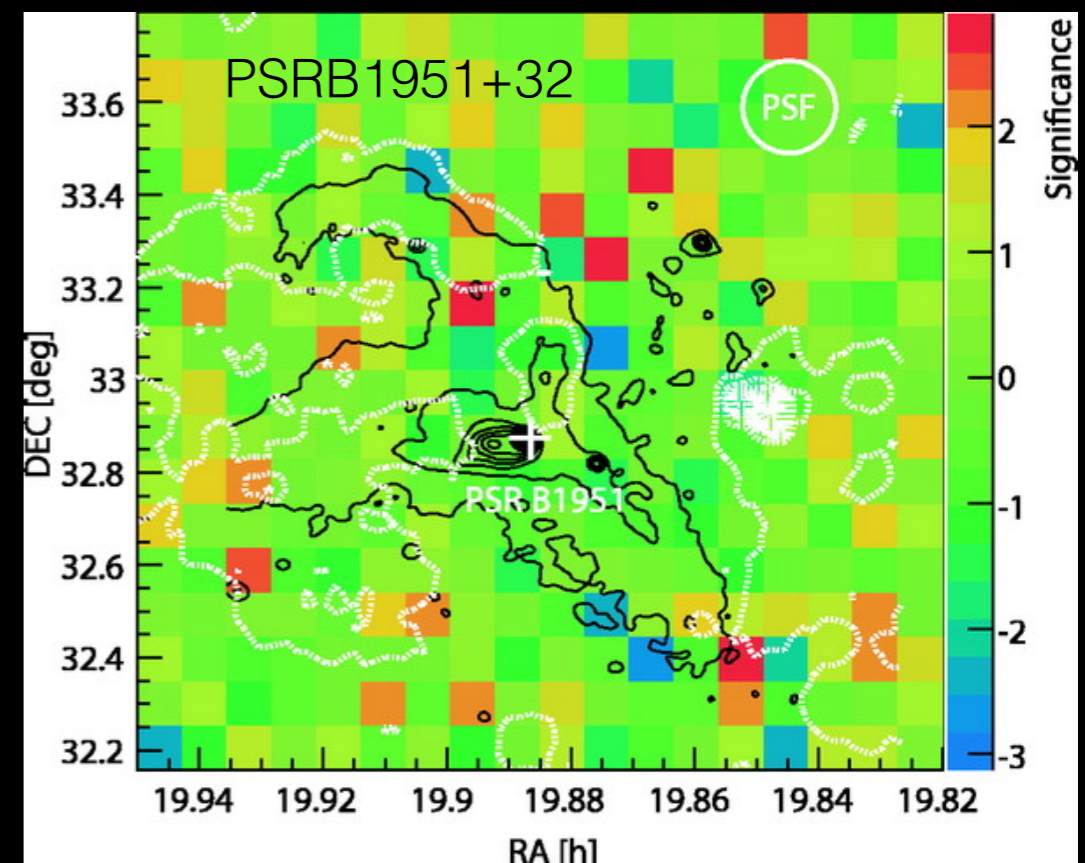


# Science cases: spectral line evolution

- Modeling of some source of interest of VHE astrophysics is aided by a time-resolved knowledge of diagnostic spectral lines. For instance:
  - B/Be spectral line evolution in systems with radio pulsar and elliptical orbits
  - Spectroscopic time-resolved monitoring of lines in blazars (FSRQ) during active phases and/or in the long term.



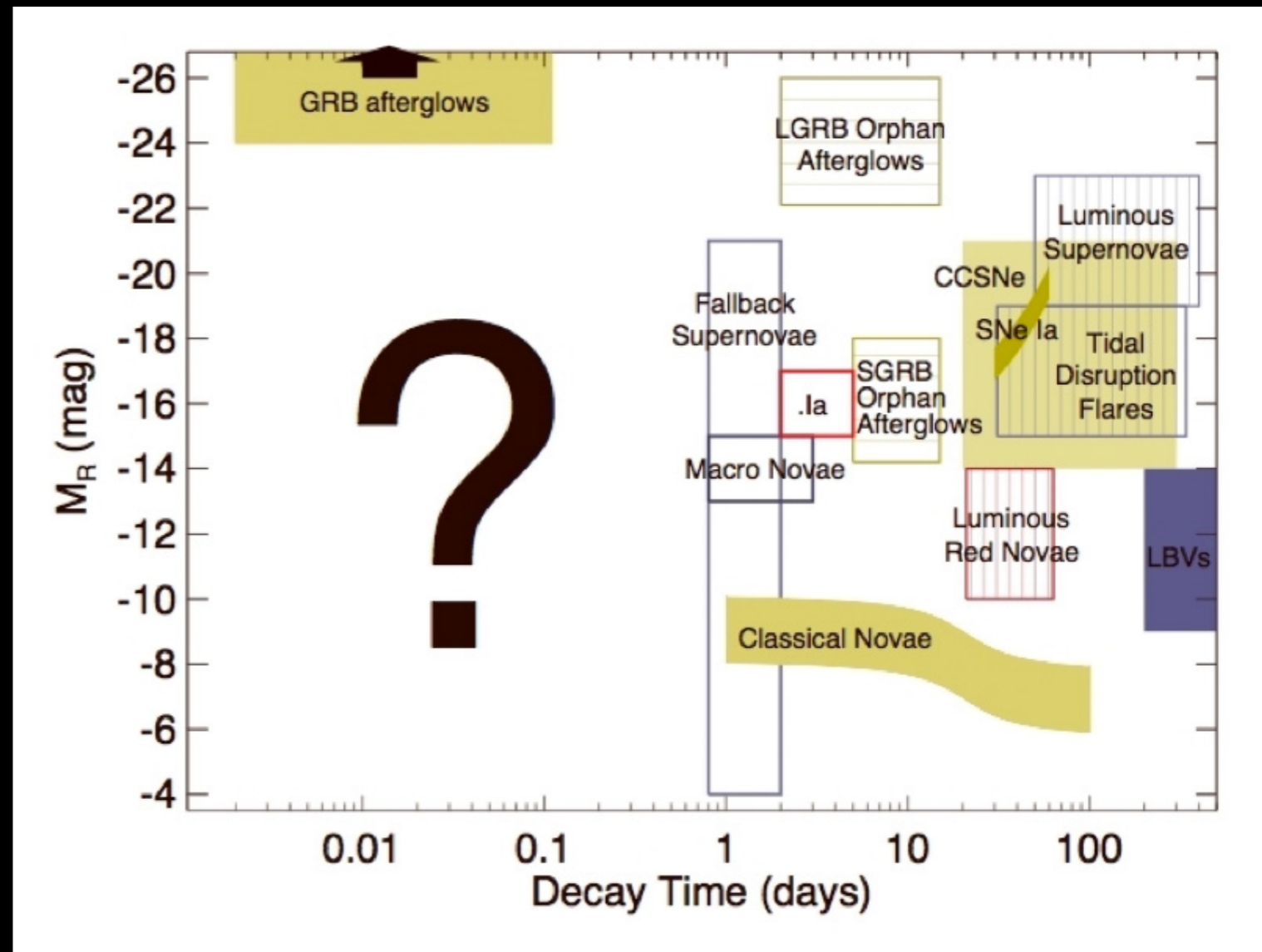
Aleksić et al. (2015)



Albert et al. (2007)

# Science cases: rapid photometry

- It is likely that one or more small-size telescopes will assist CTA observations in real-time.
- There are cases, however, where 1m-class telescopes are definitely too small to guarantee photometric information on time-scales comparable to those obtainable at VHE.
- Very rapid photometry, possibly in more bands simultaneously, again requires moderately large telescopes.



Possible cases are related to rapid blazar variability, but also for all the possible transient phenomena detectable with the CTA.



# How much time?

- We expect that, as it is for MAGIC, most of the observing time be devoted to blazars (~50%). Other categories of sources require a smaller percentage of time. Publication output respects a similar share too.
- CTA deeply interested in optical : e.g. a "redshift determination task force" has been set up for potential CTA blazars.
- A TNG-like instrument (NOT, etc.) can provide polarimetry and/or, when required, time-resolved low-resolution spectroscopy. Even before and after the observations.
- For regular monitoring a 1m-class telescope, properly equipped, can safely do the job. In case of big flares, or other special cases, intense monitoring asks for a bigger facility.
- A not too imaginative bet is that a couple of non-consecutive weeks per semester devoted to CTA science could be adequate (meant non necessarily at the TNG only).
- Clearly the possibility to access to any facility with regular GO time is always present.