Strong Lensing Acceleration Probe

REQUIREMENTS

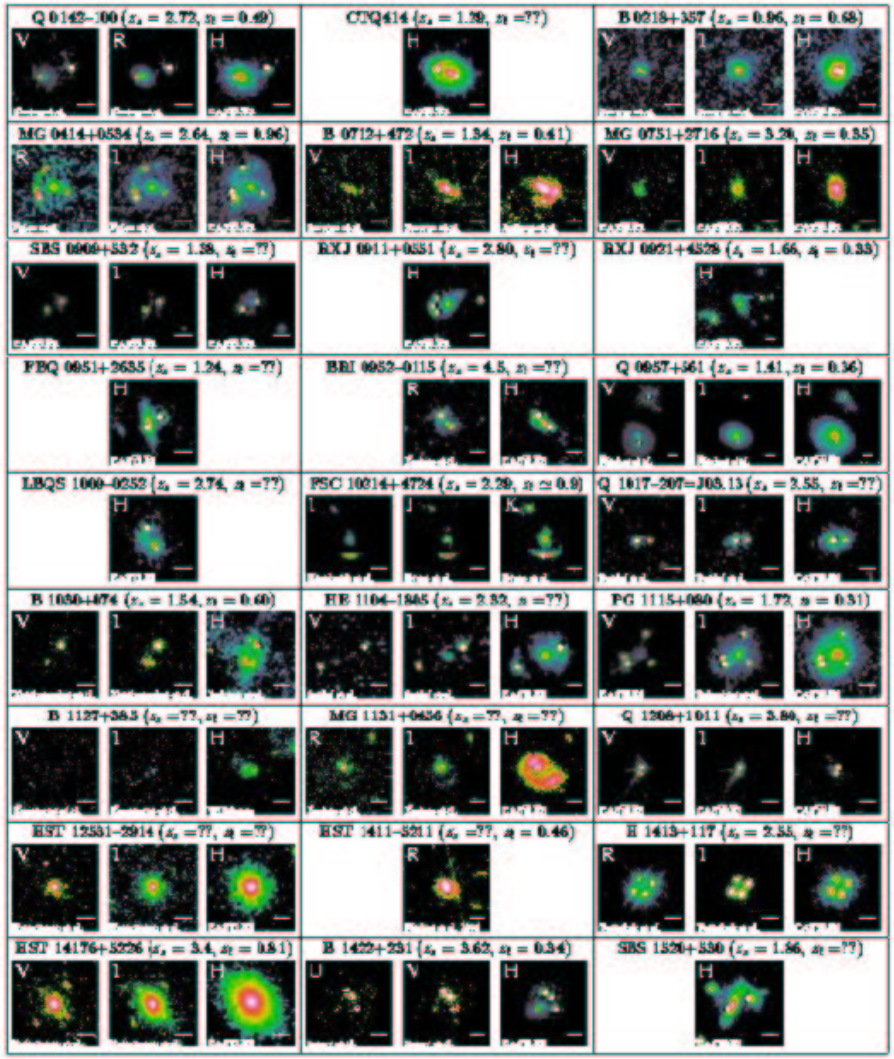
- 1 degree field of view
- 0.1’’ pixels −Gpx imager
- Limiting magnitude R ~ 30; (m_{AB}~32 co−added)
- Deep survey ~20 fields
- Shallow survey ~200 fields
- Spectroscopy
- 11 band
- Repeat every 2 d

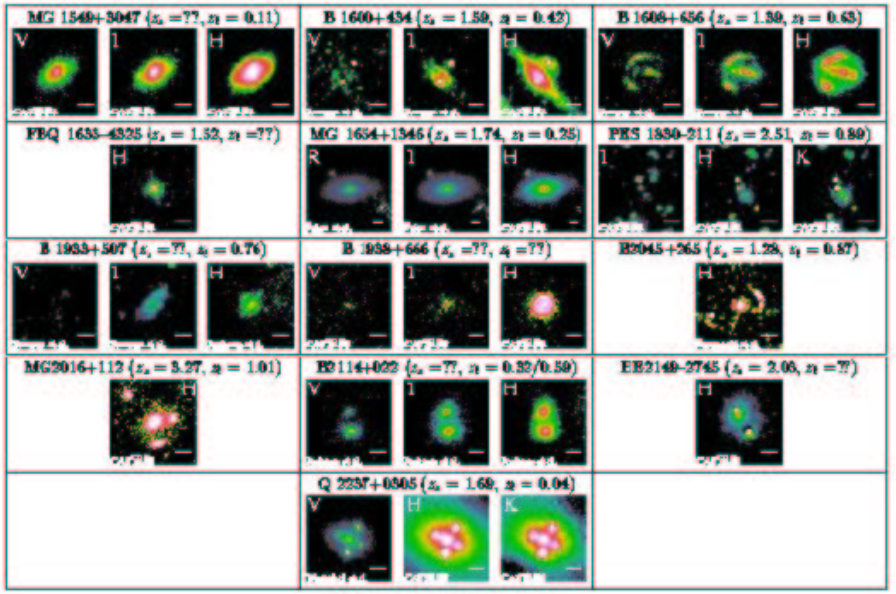
Strong (multiple) field lensing rate

- CLASS 16000 images => 18 lenses (Myers et al)
- =>N ~ 10^{-3} x 10 x $10^{6.5}$= $10^{4.5}$multiple images in DS
- 0.3−3’’separation; zd ~ 0.5 lenses; faint, compact sources
- Sample Selection:
  - Single unreddened elliptical lenses in lower density regions
  - Photometric separation of achromatic excesses over deV
  - Geometric − double/quad templates, standard profiles + κ,γ
- Expect well−selected sample with N>1000
- Spectroscopic z_d; photo−z_s; δz_s ~ 0.1?
- cf ACS 1 sq deg to I~25 in 2 colors, once =>~100 lenses

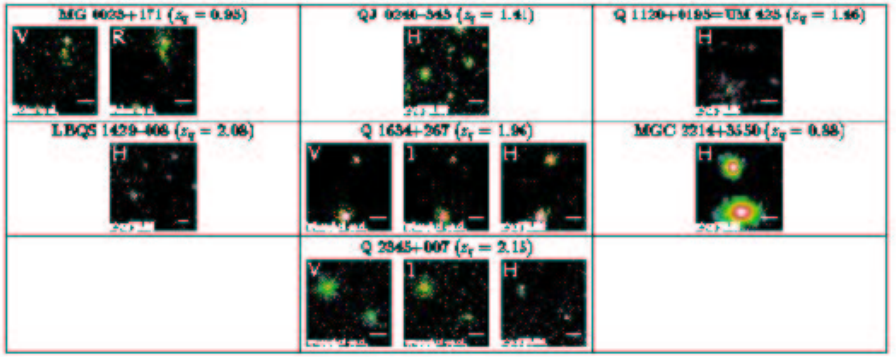
CASTLES SURVEY (*Falco et al*)

~ 50 lenses





Binary Quasars



Cosmography with isolated elliptical sample

- Nuclear physics experiment
  - Elliptical light profiles are regular (fundamental plane)
  - Mass potentials are (perhaps) regular and scalable in magnitude and redshift (Koopmans & Treu)
  - Measure cross section => refined gravitational potential

    especially cores
- Cosmography
  - Variable sources (2d sampling) => H_0
    - Mass sheet degeneracy
  - Ω, w....

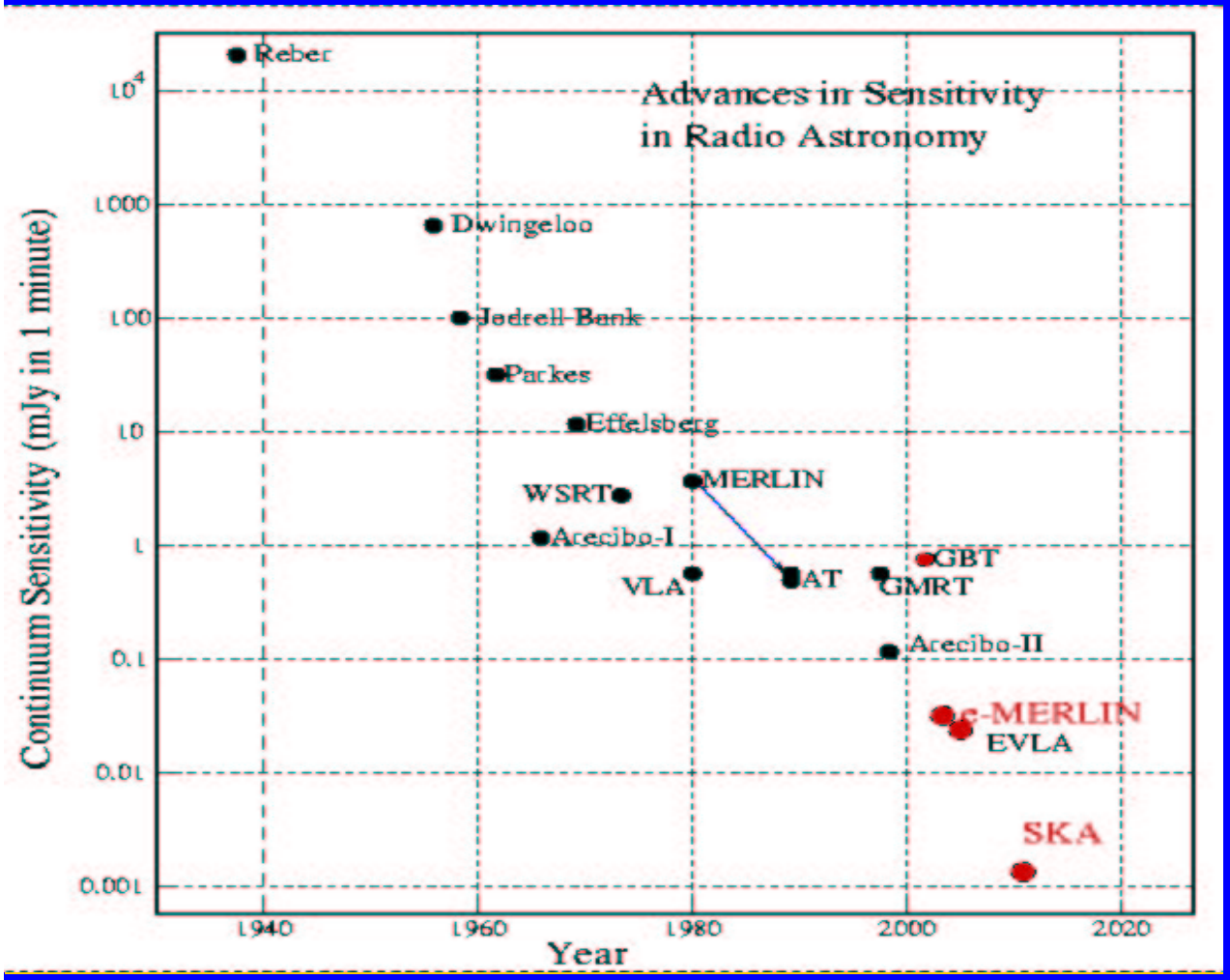
$$\left(\frac{\partial \Omega}{\partial z_s}\right)_{d,f} \approx 0.5; z_d \approx 0.5; z_s \approx 2$$

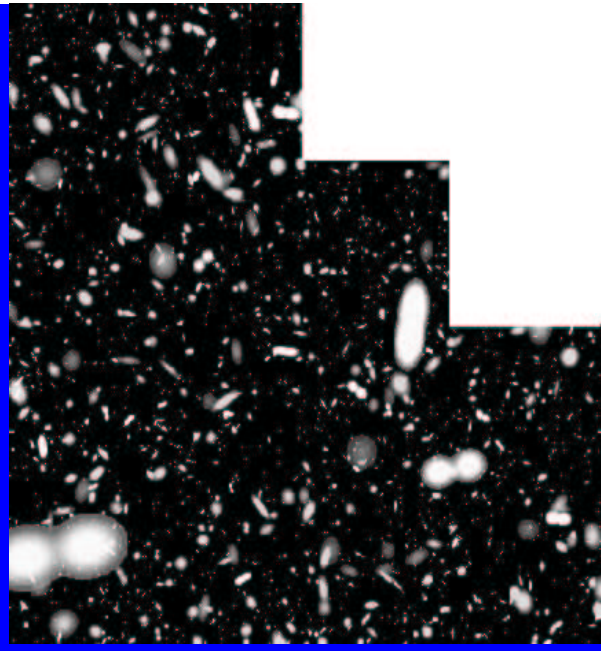
$$\delta \Omega \approx 0.5 \, \delta z_s$$

Other Samples

- Clusters, compact group lenses
  - Dark matter density (lens profiles truncated)
- Spiral lenses
  - Probe of halos (microlensing), ISM etc (reddening)
- Interacting lenses
  - Model encounters, rates etc (need v(**r**))
- Low σ image geometry (swallowtail, umbilics)
  - High magnification (sensitive to environment)

The SKA Connection





30−100 in sensitivity
151 MHz − 20 GHz
>300 km baselines
At 1 GHz,
1^{o} Field of View
0.1" resolution
100 Mpx
3×10^{5} sources
Dynamic range − 10^{6}
Channels − 10^{4}
Pulsar timing

10,000 lenses?

Summary

- SNAP (unintentionally) well−designed for statistical studies of strong lenses
- Understand the physics and can model elliptical galaxies; need photo−z for sources
- Cosmographic and high k dark matter studies possible
- Need to carry out program of simulations using imaging data to be more quantitative
- Dialog with SKA team (at UCB!)