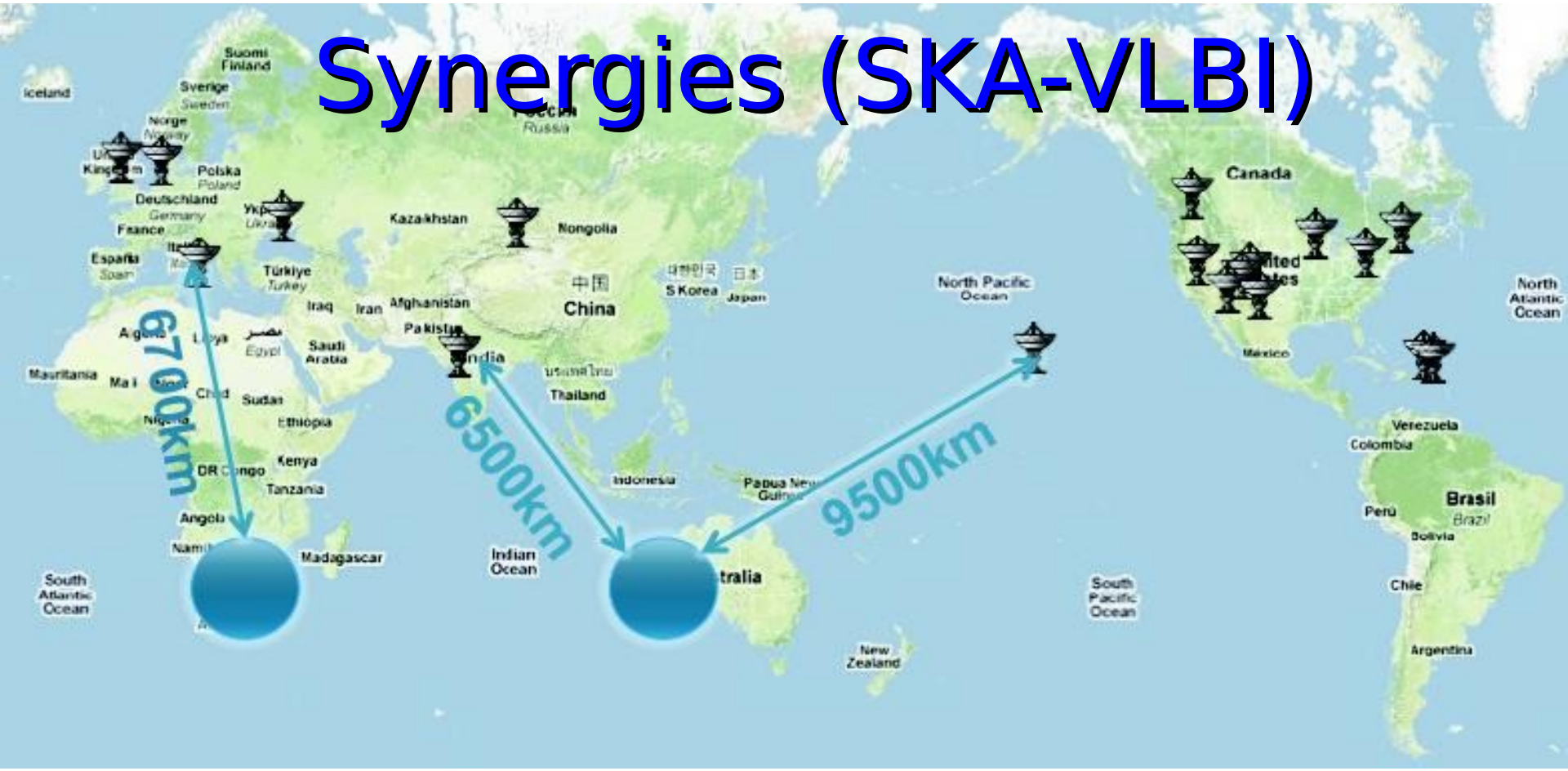
SKA and VLBI Synergies (SKA-VLBI)



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EWASS 2015 – Special Session 21

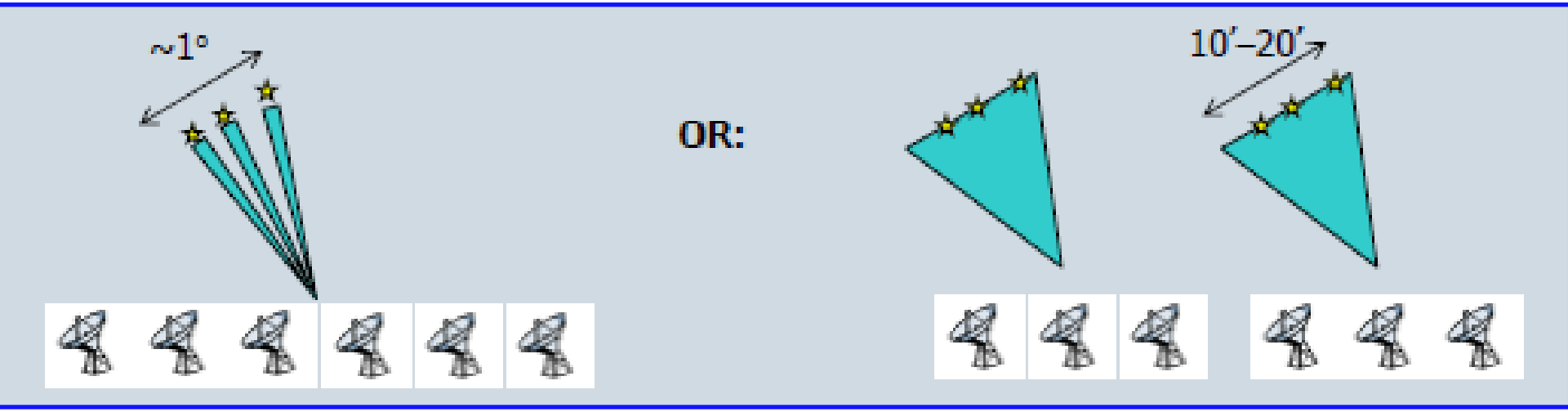
Why VLBI with the SKA?

- New capabilities for the full range of resolutions between the milliarcsecond and the arcsecond

- It will enhance dramatically the sensitivity of the VLBI arrays

- It will provide very accurate flux density and polarization calibration thanks to the local interferometer data

How can SKA-VLBI be implemented?



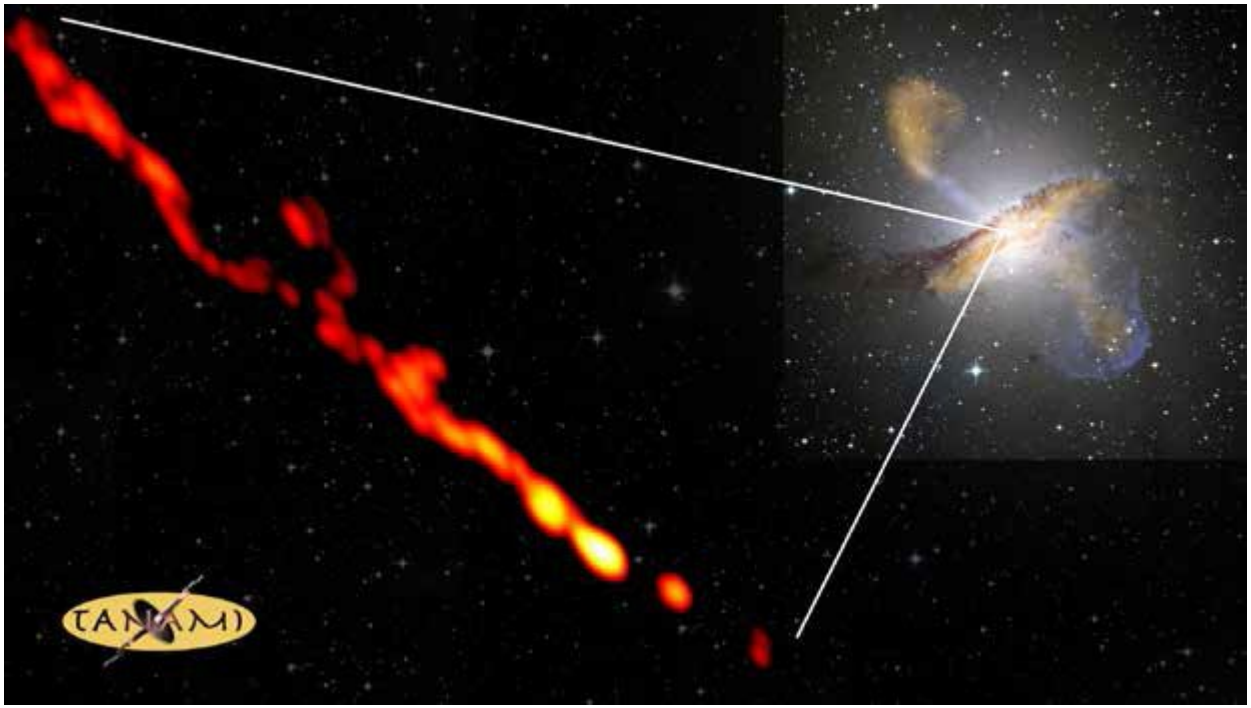
- SKA-VLBI in **phase 1**: phase-up the full core or form a number of sub-arrays. Observe together with existing radio telescopes

-SKA-VLBI in **phase 2**: elements distributed over hundreds to thousands of km (possibly merging existing VLBI telescopes)

High-resolution + high-sensitivity SKA science

- Physics of the vicinity of SMBH by polarisation and brightness temp. measurements

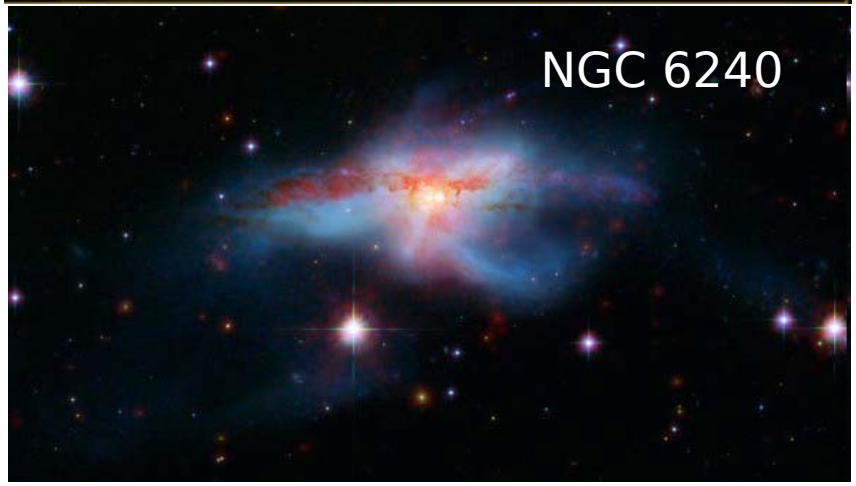
- Outflows from the cores of galaxies (both ultra- and mildly relativistic)



High-resolution + high-sensitivity SKA sci

- Physics of the vicinity of SMBH by polarisation and brightness temp. Measurements

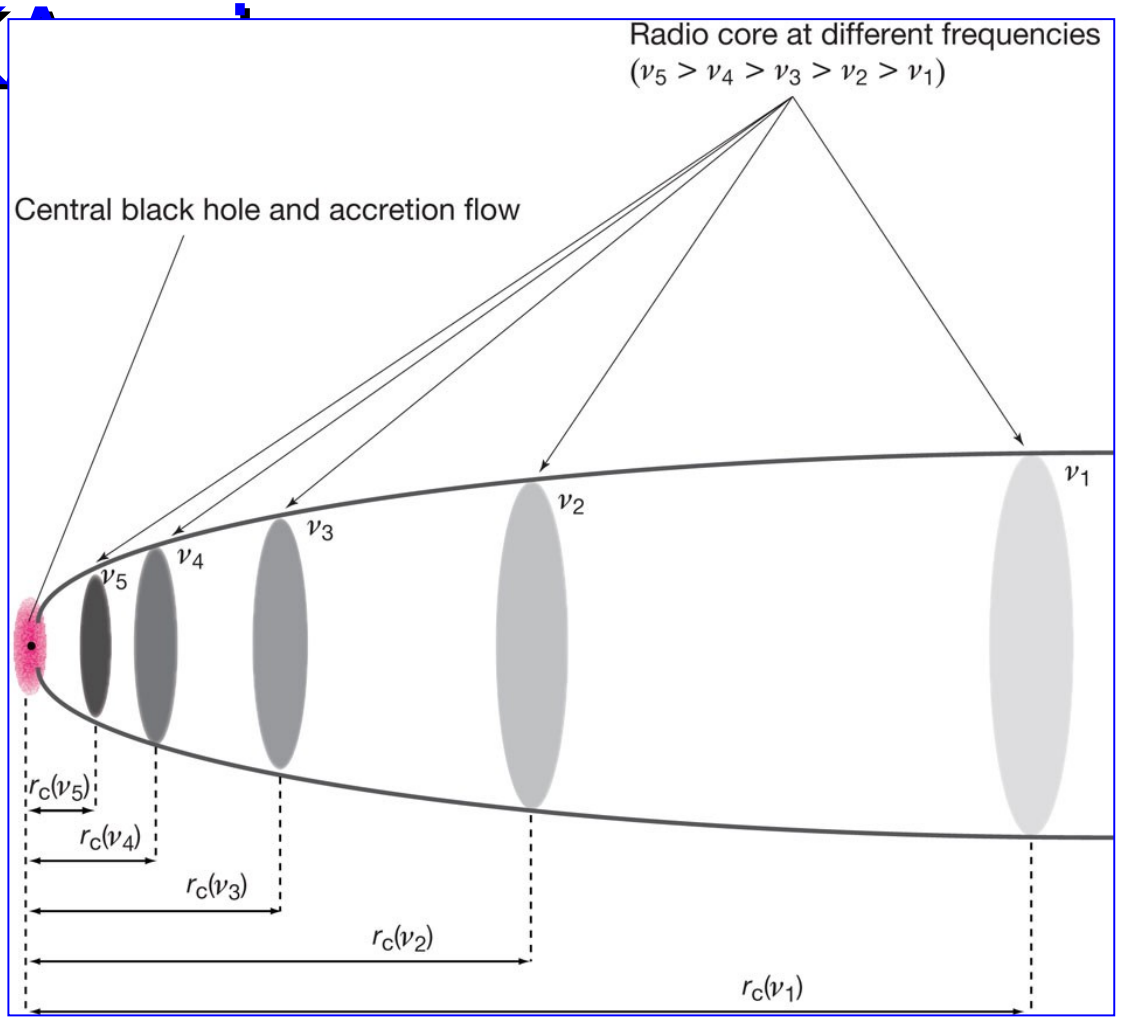
- Post-merger processes in galaxies (weak AGN radio emission)



High-resolution + high-sensitivity SK

-Astrometry of AGN (post-GAIA)

→ core-shifts: study accretion/magnetic fields/jets from stellar to supermassive BH

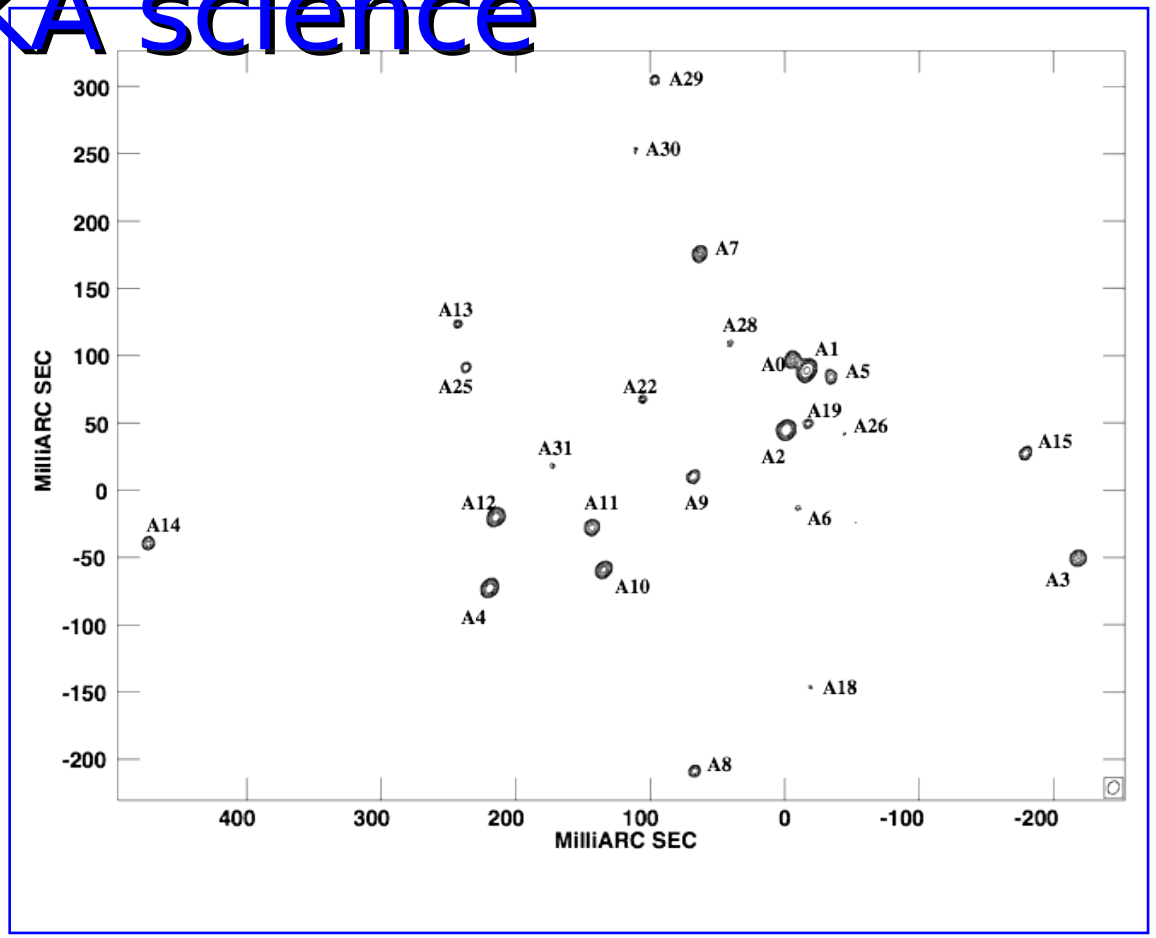


Hada et al. 2011

High-resolution + high-sensitivity SKA science

-Astrometry of AGN (post-GAIA)

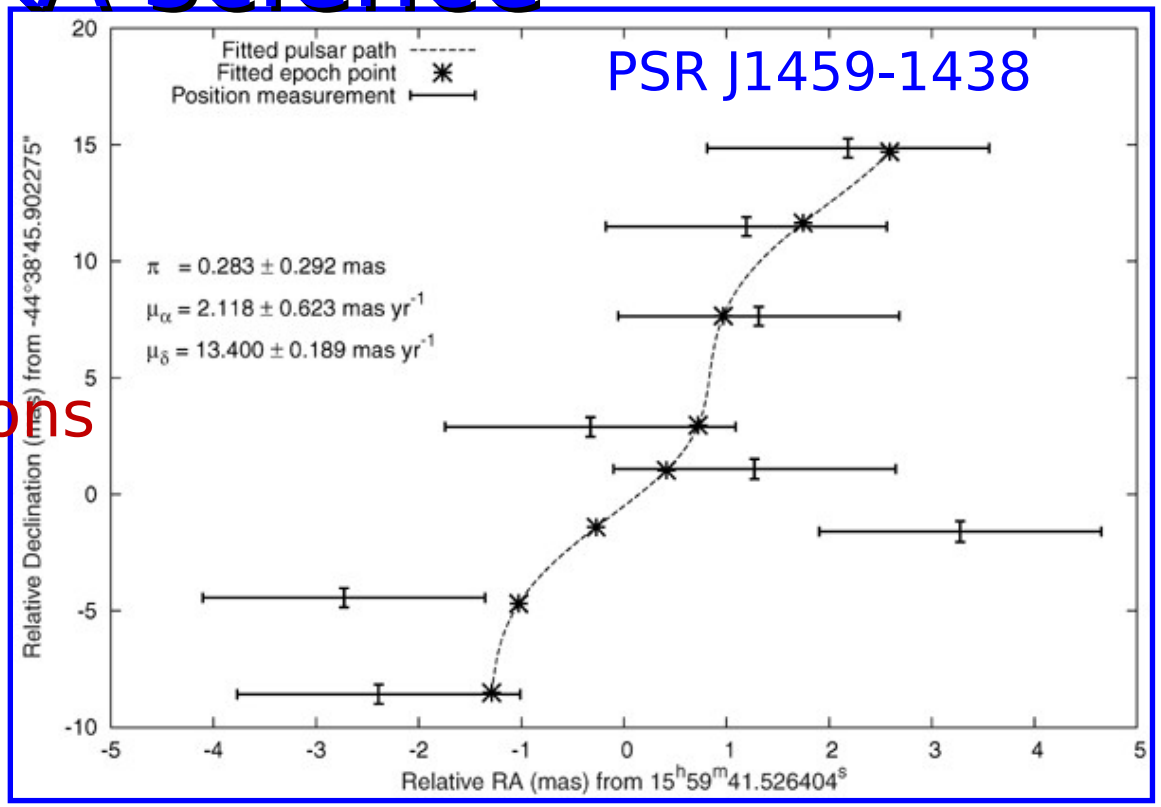
- Supernovae and starburst processes in galaxies



Bondi et al. 2012

High-resolution + high-sensitivity SKA science

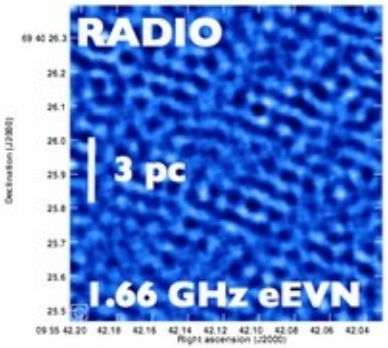
-Astrometry of AGN (post-GAIA)
 - Supernovae and starburst processes in galaxies
- Pulsar proper motions

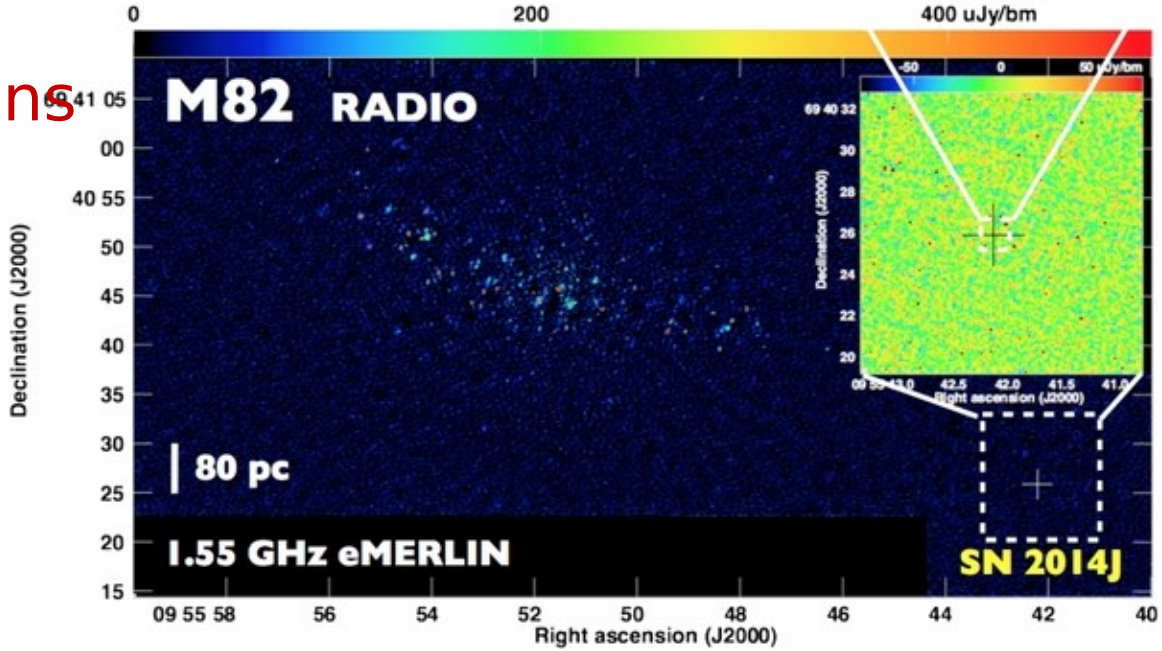


Deller et al. 2009

High-resolution + high-sensitivity SKA science

-Astrometry of AGN (post-GAIA)
 - Supernovae and starburst processes in galaxies
-Pulsar proper motions
-Explosive Outflows



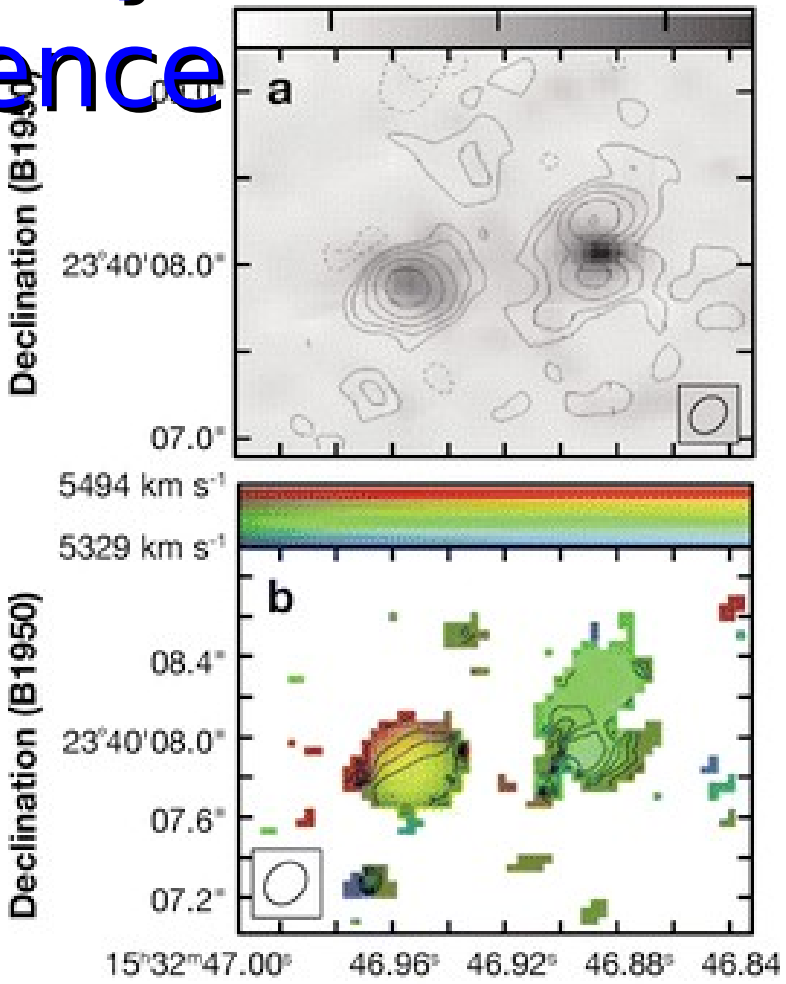


Pérez-Torres et al. 2014

High-resolution + high-sensitivity SKA science

-Astrometry of AGN (post-GAIA)
 - Supernovae and starburst processes in galaxies
-Pulsar proper motions
-Explosive Outflows
-Stellar astrometry (search for exoplanets)

- Nuclear gas in galaxies (megamasers and nuclear absorption)

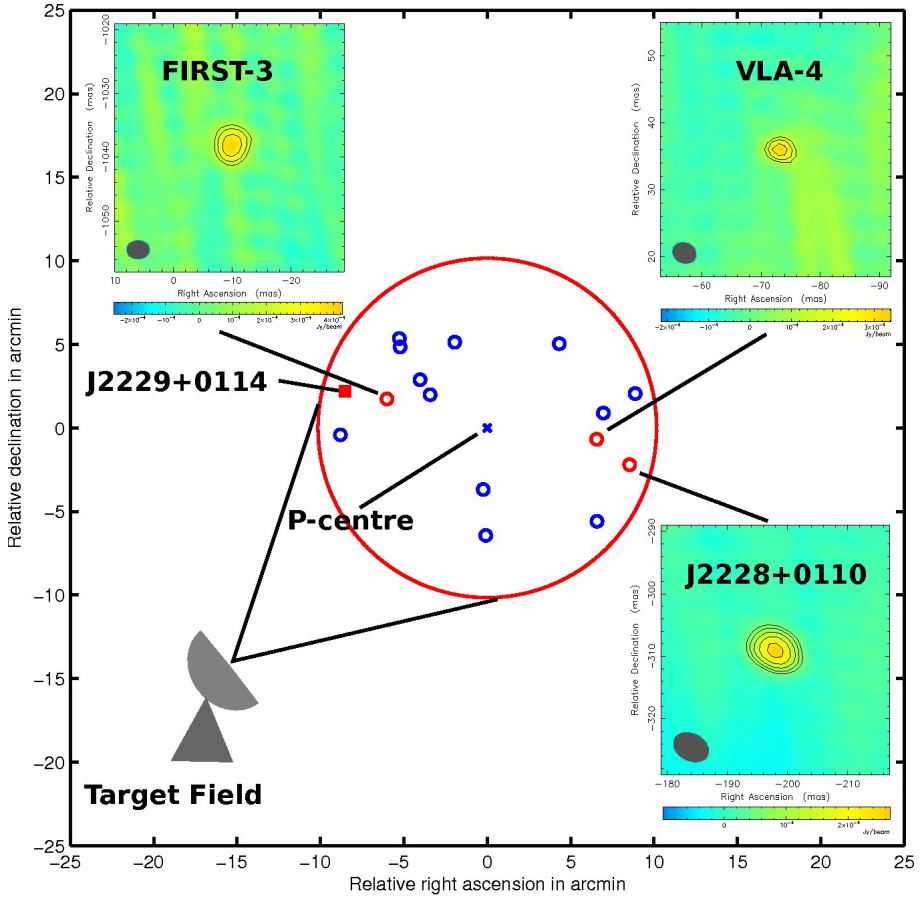


Rovilos et al. 2003

Surveys with SKA-VLBI

Wide FoV VLBI → modern S/W correlators; however,

Phasing-up SKA1-mid limits the FoV!!! 1) sub-arrays help (only a fraction of the core could be used); 2) rapid source switching of 4 tied-array beams (moderate loss of sensitivity) → SKA2



Sub-mJy population: SKA-VLBI will be the most powerful way to detect AGN → MBH at low accretion rates

Cao et al. 2014

Summary

SKA-VLBI will offer great science

-Phase I: Improved sensitivity and astrometric precision (multiple beams) for target based-observations

- Phase 2: VLBI surveys + high angular resolution observations