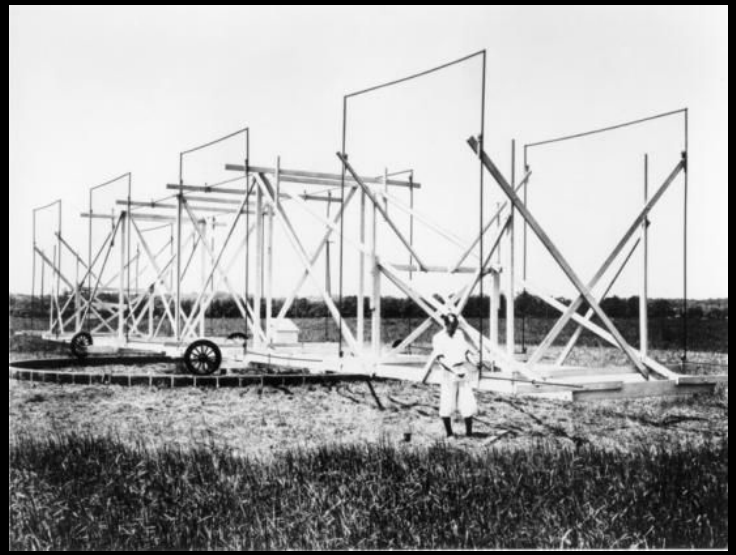
Radio arrays



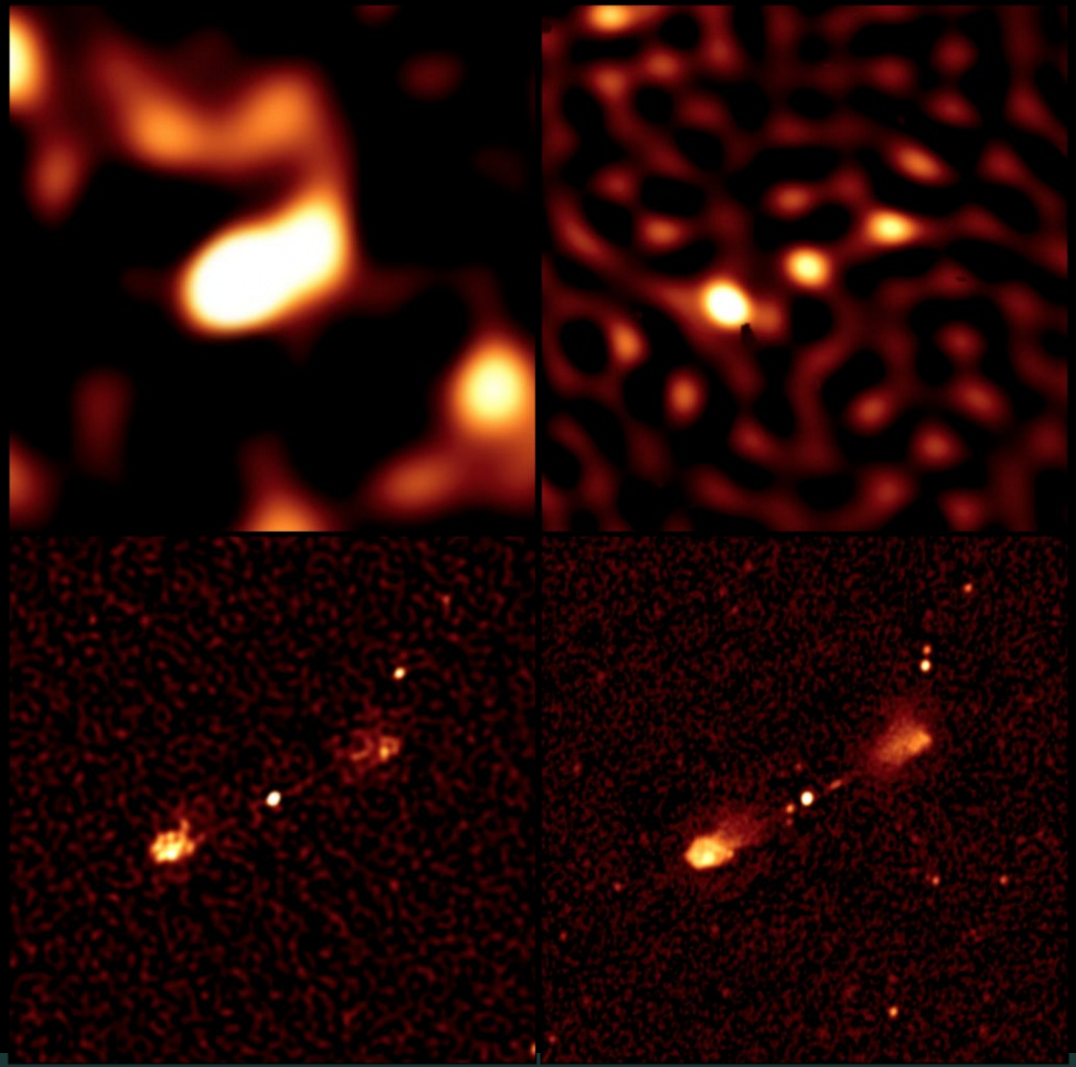


Image: SKA/Meerkat (Radio); NRAO (Optical)

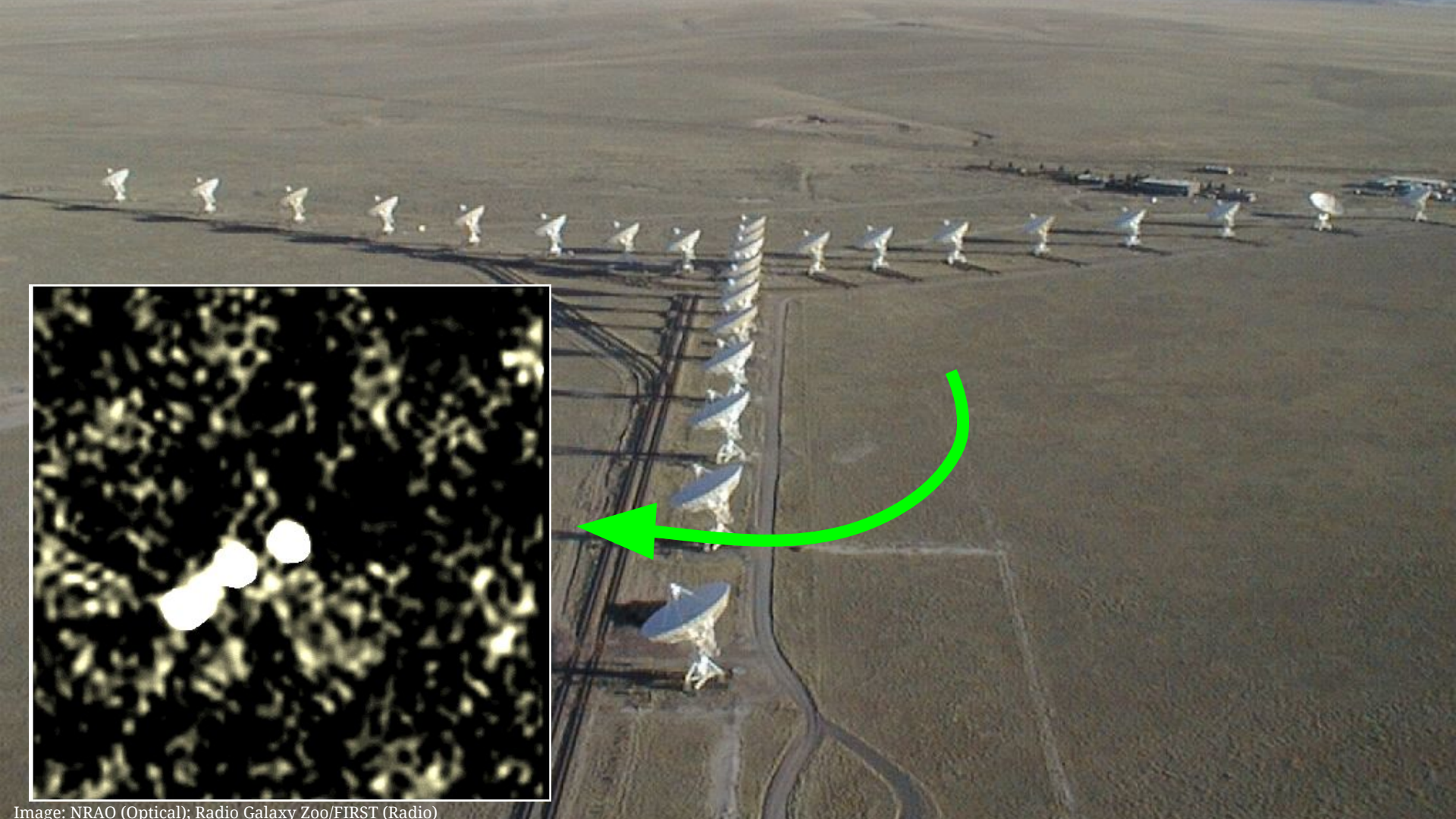


Image: NRAO (Optical); Radio Galaxy Zoo/FIRST (Radio)

ASKAP
(Western Australia)

Image: CSIRO
Title slide image: Cosmovision (led by Dr. Wolfgang Steffen of the Instituto de Astronomia, UNAM, Ensenada, Mexico) for A. Marscher; NRAO/AUI/NSF

ASKAP (Western Australia)

- Huge 30 deg^2 field of view
- Fast!
- 32 antennae
- 15500 km of optical fibre
- 1.9 Tb/s
- 4000 m^2 collecting area
- 2 PB of science data so far

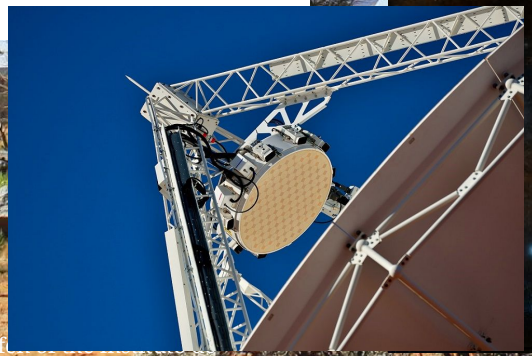


Image: CSIRO
Title slide image: Cosmovision (led by Dr. Wolfgang Steff… Astronomia, UNAM, Ensenada, Mexico) for A. Marscher; NRAO/AUI/NSF

Small Magellanic Cloud (ASKAP)

Image: ANU/CSIRO (Radio); David Malin, Anglo-Australian Obs./Royal Obs. Edinburgh (Optical)

Image: WPLG

MeerKAT (South Africa)

- 64 antennae
- ~1 Tb/s
- 9000 m^2 collecting area
- 2” resolution

Image: WPLG

The Galactic Centre (MeerKAT)

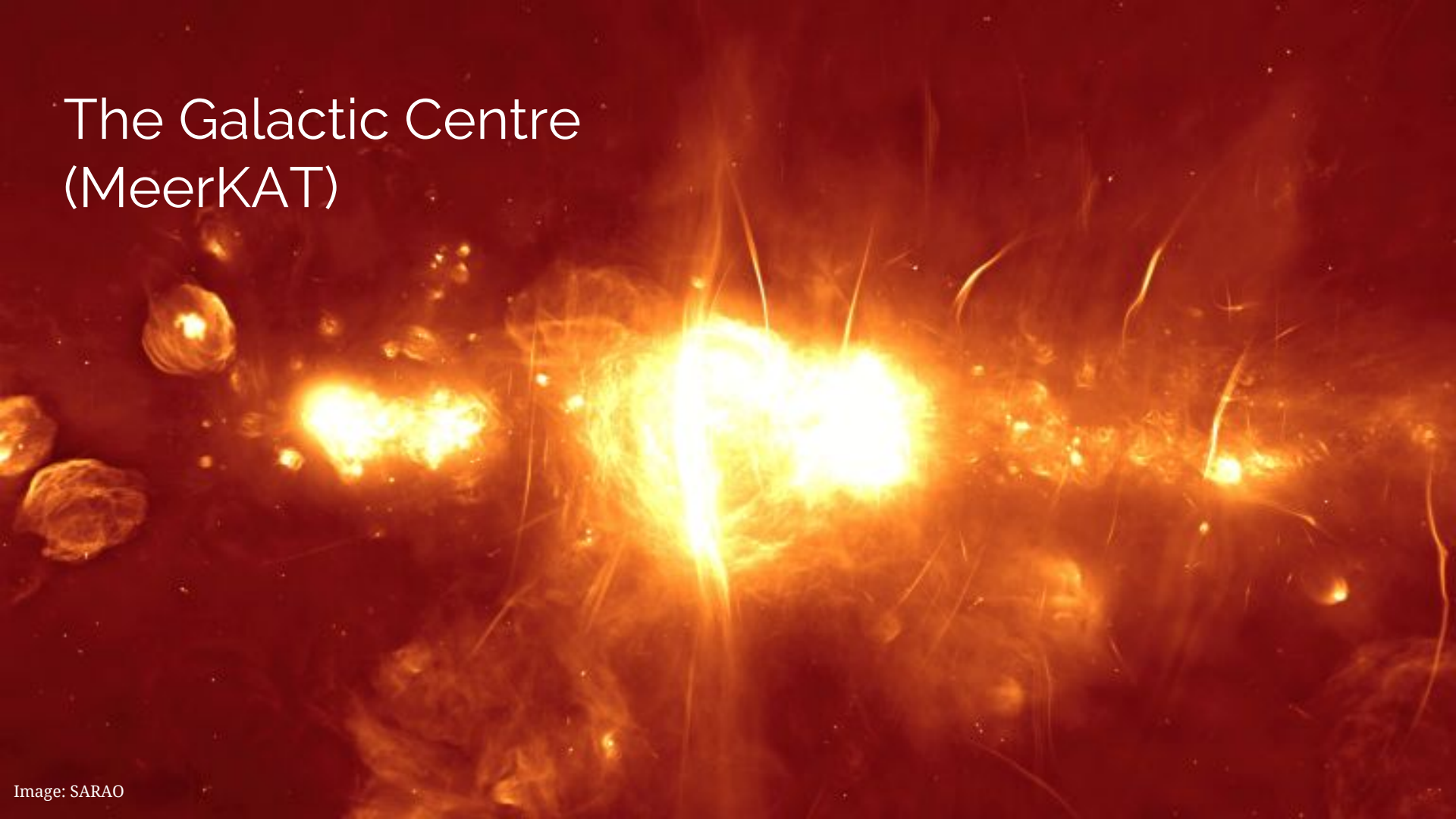


Image: SARAO

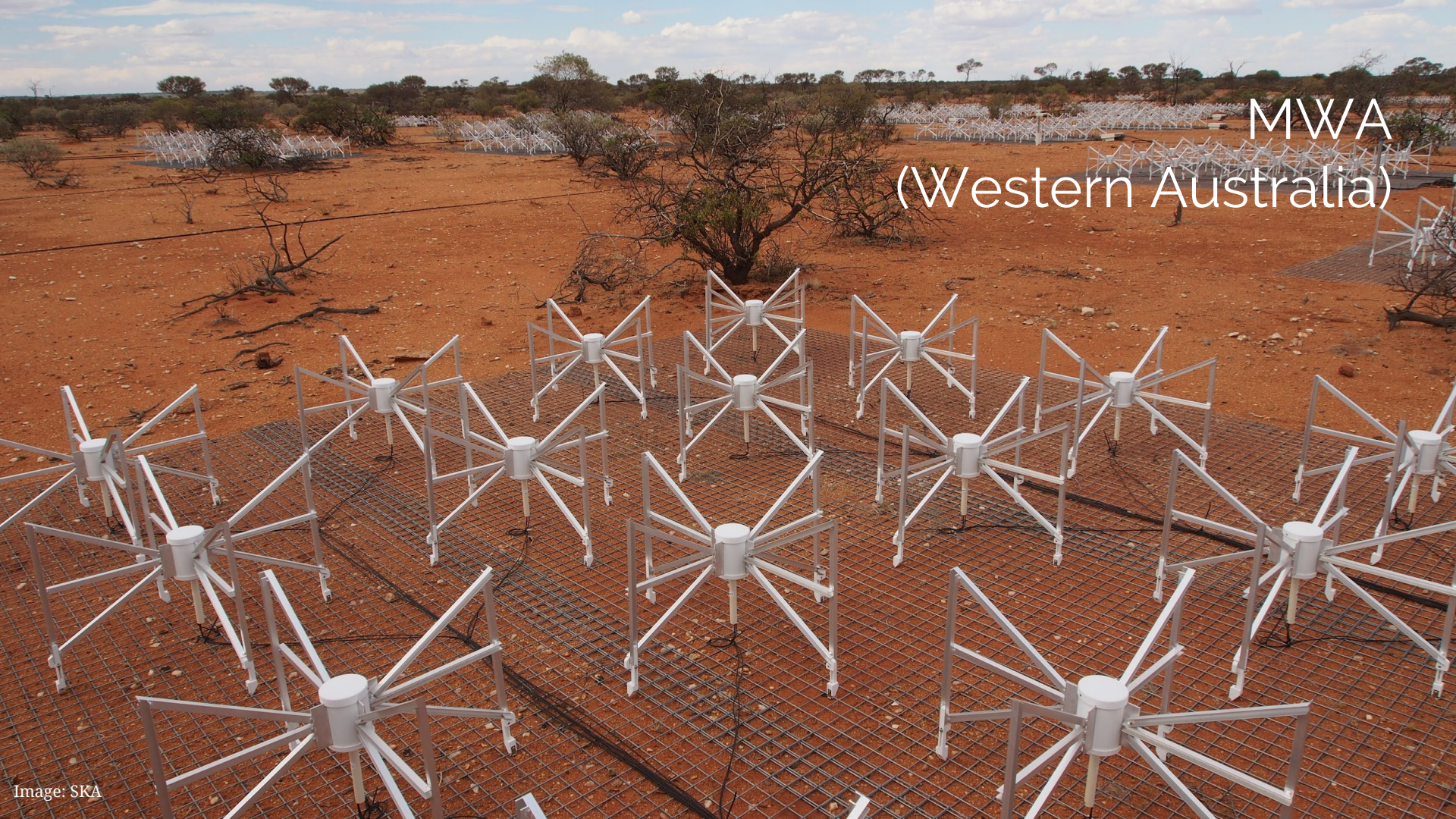


Image: SKA

MWA (Western Australia)

- 2048 antennae in 128 tiles
- Low frequency
- *Huge* 2500 deg^2 field of view
- Very fast!
- 2000 m^2 collecting area

Image: SKA; Sky & Telescope; CSIRO

The Milky Way (and Centaurus A) (MWA)

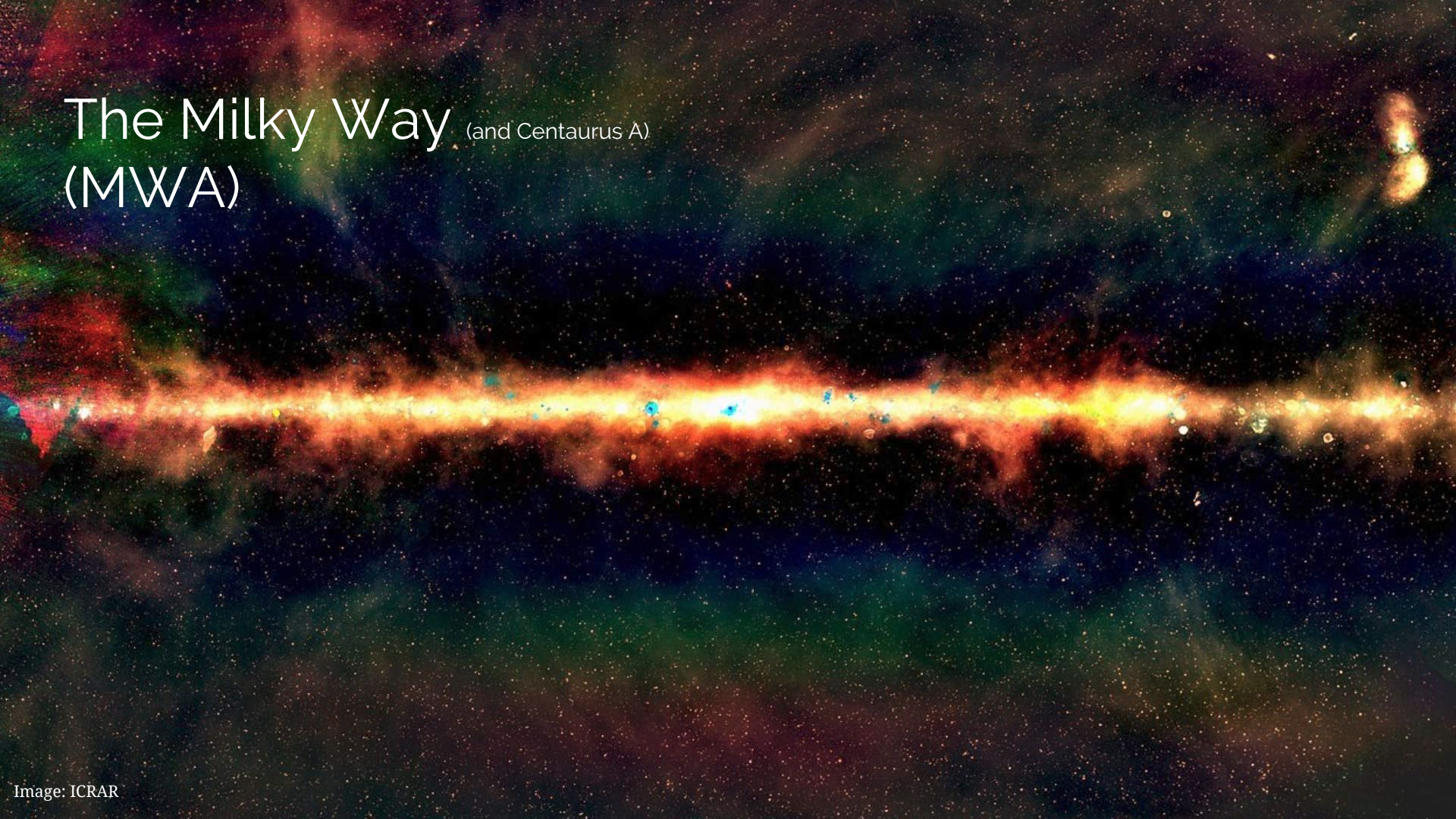


Image: ICRAR

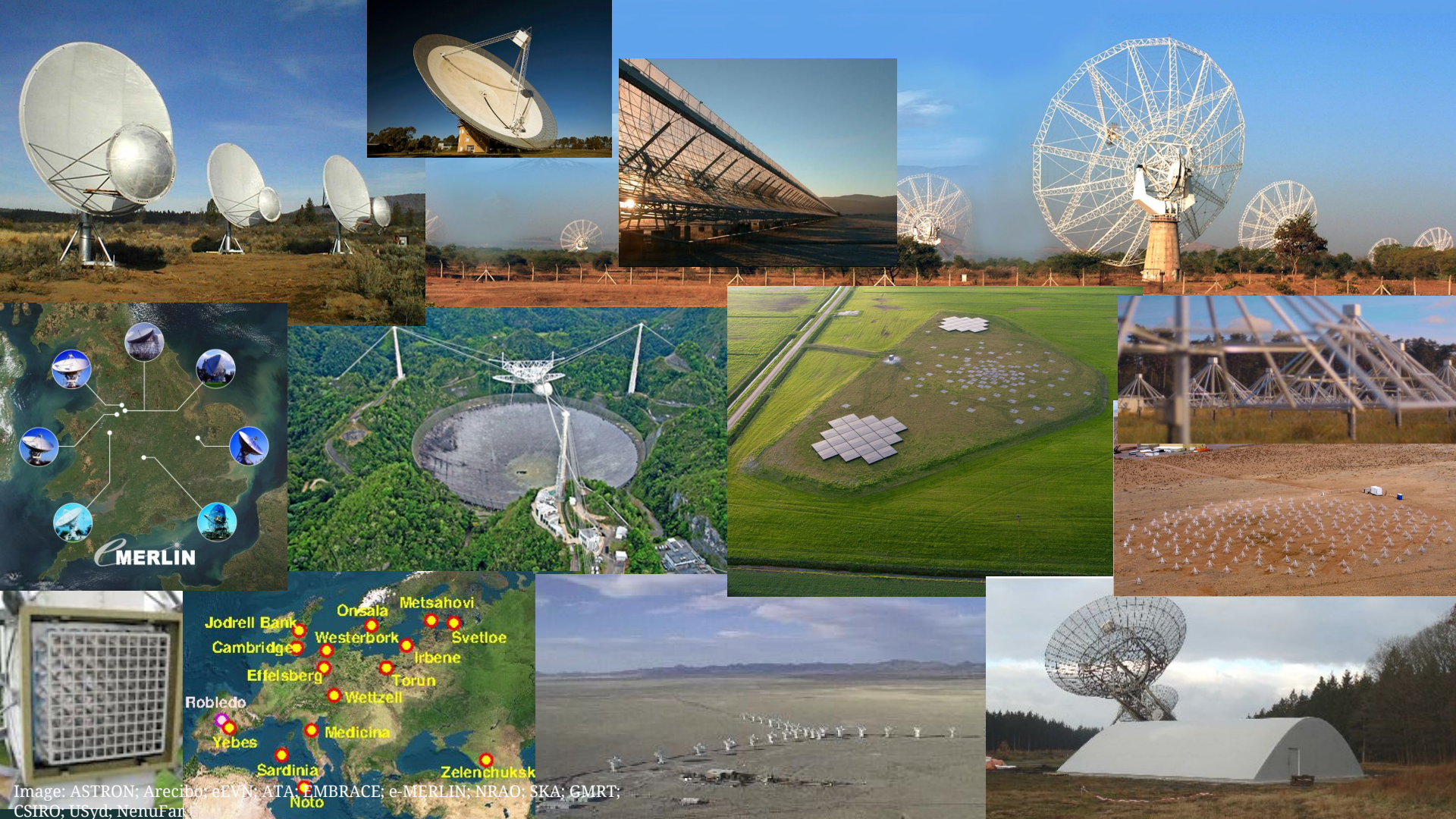


Image: ASTRON; Arecibo; eEVN; ATA; EMBRACE; e-MERLIN; NRAO; SKA; GMRT; CSIRO; USyd; NenuFar

Image: SKA Project Development Office and Swinburne Astronomy Productions

What does the SKA want to investigate?

- Galaxy evolution
- Cosmology
- Dark energy
- Pulsar/black hole tests of general relativity
- Giant magnetic fields
- Cosmic dawn
- First star/black hole formation
- SETI
- Astrobiology
- Unknown unknowns

Image: SKA

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Galaxy evolution

Image: NASA

How do radio jets affect galaxy evolution?

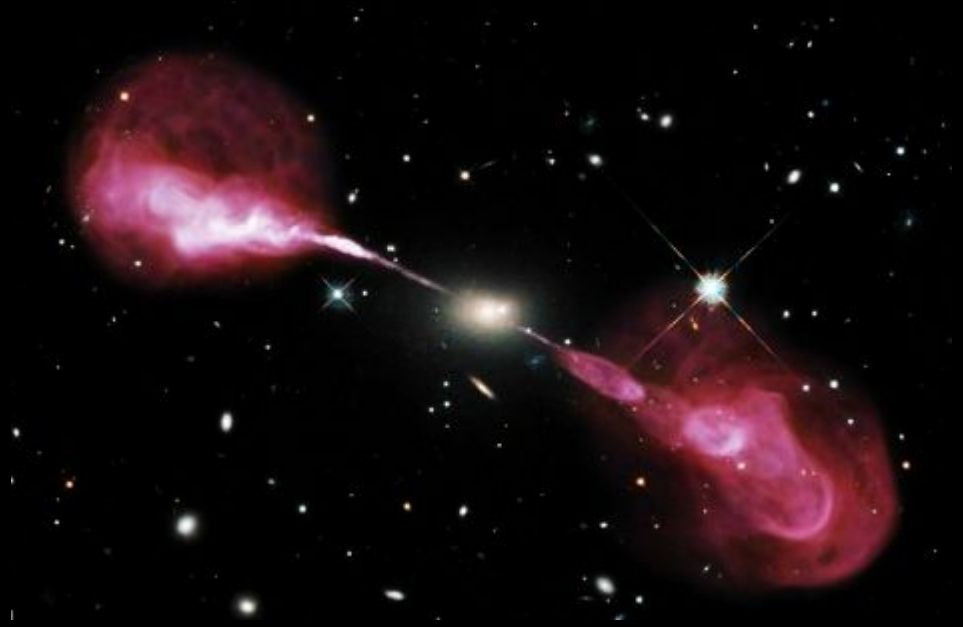
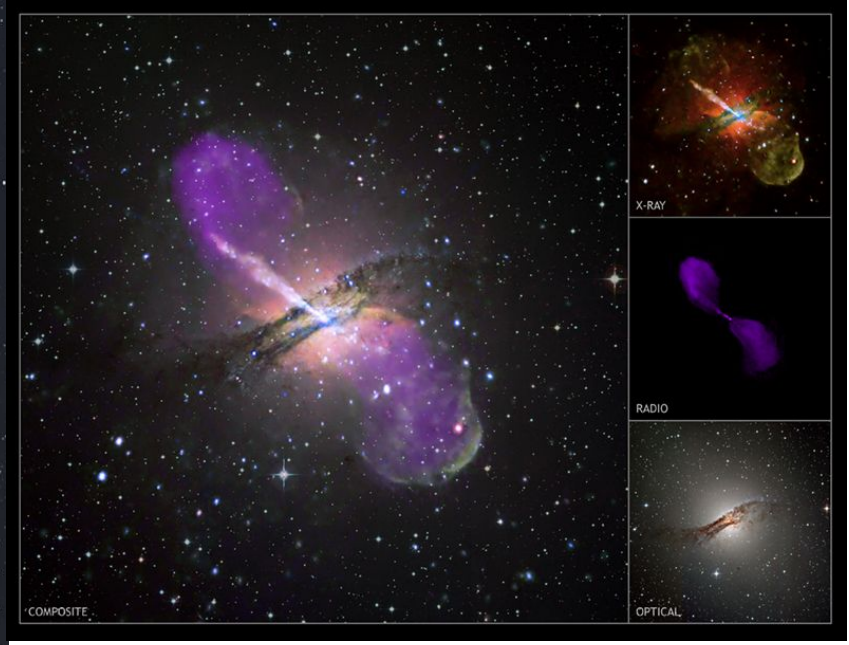


Image: VLA

How do radio jets affect galaxy evolution?

Image: VLA

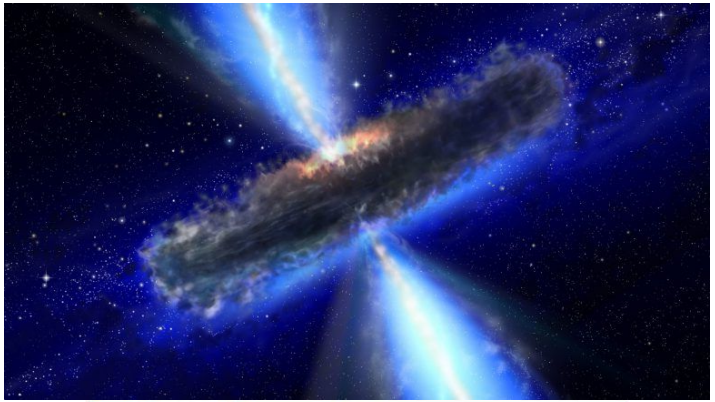


Centaurus A, a radio galaxy 13 million light years away.

Top: NASA/CXC/R.Kraft (CfA), et al.; NSF/VLA/M.Hardcastle (U Hertfordshire) et al.; ESO/M.Rejkuba (ESO-Garching) et al.
Left: Ilana Feain, Tim Cornwell & Ron Ekers (CSIRO/ATNF); R. Morganti (ASTRON); N. Junkes (MPIfR); Shaun Amy, CSIRO

Active Galactic Nuclei

- ~10^{21}–10^{28} W/Hz
- ~10^{6}–10^{8} $M_{\odot}$
- Pretty big
- Fun and exciting jets



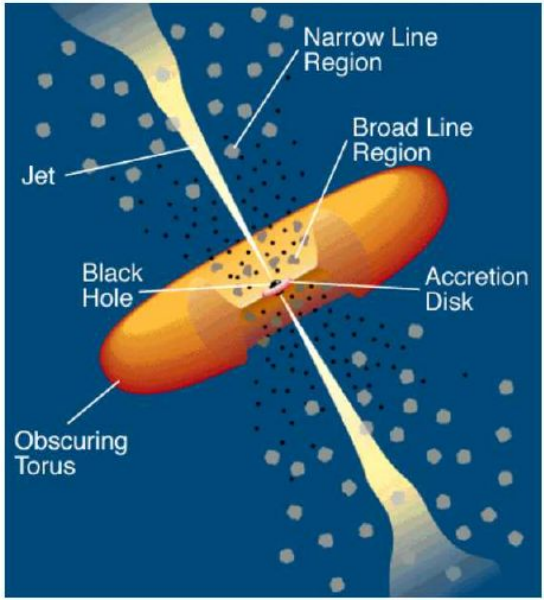
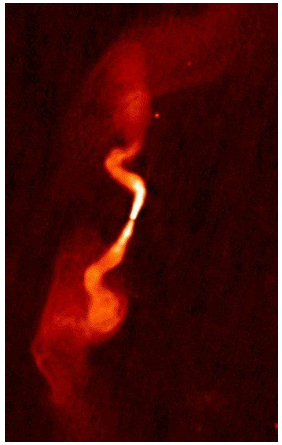
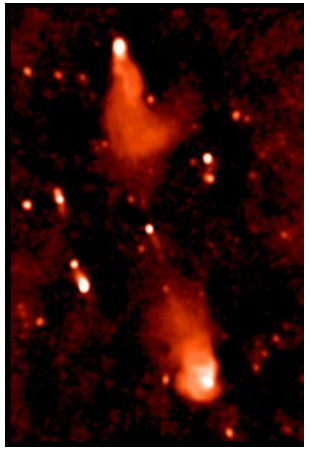
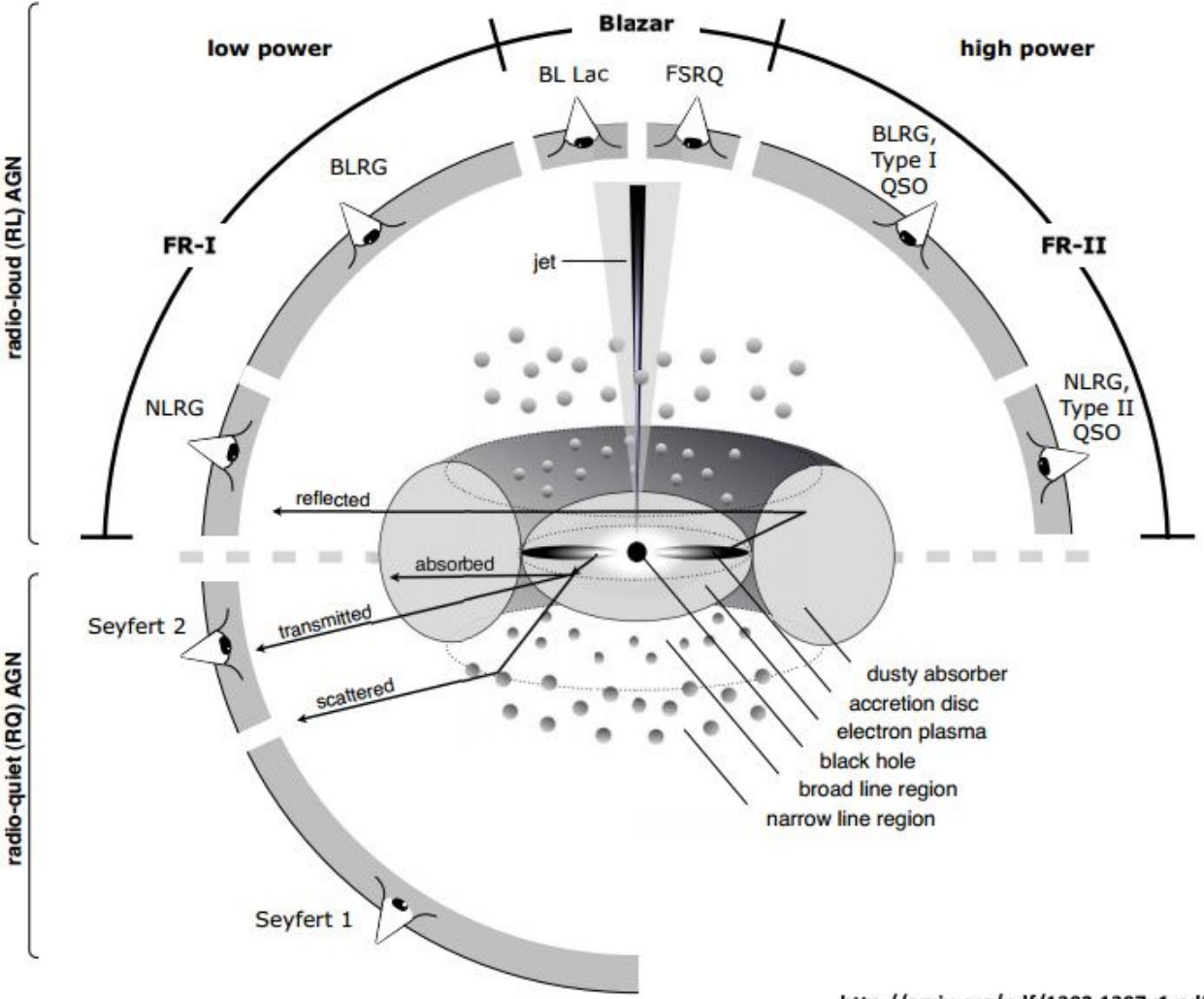


Image: Urry & Padovani (1995); ESA/NASA, the AVO project and Paolo Padovani







http://arxiv.org/pdf/1302.1397v1.pdf

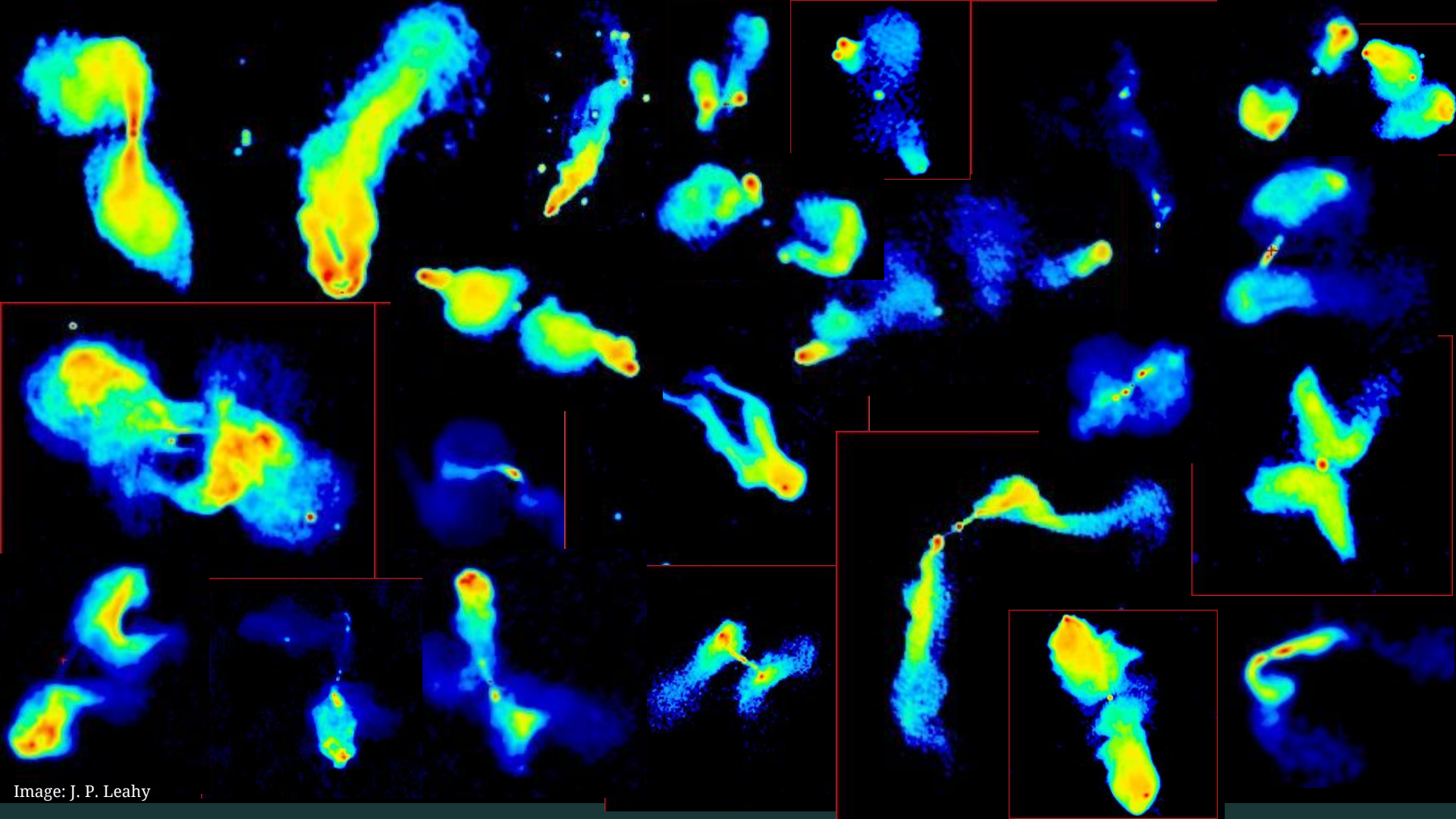


Image: J. P. Leahy

Radio galaxies are pretty big

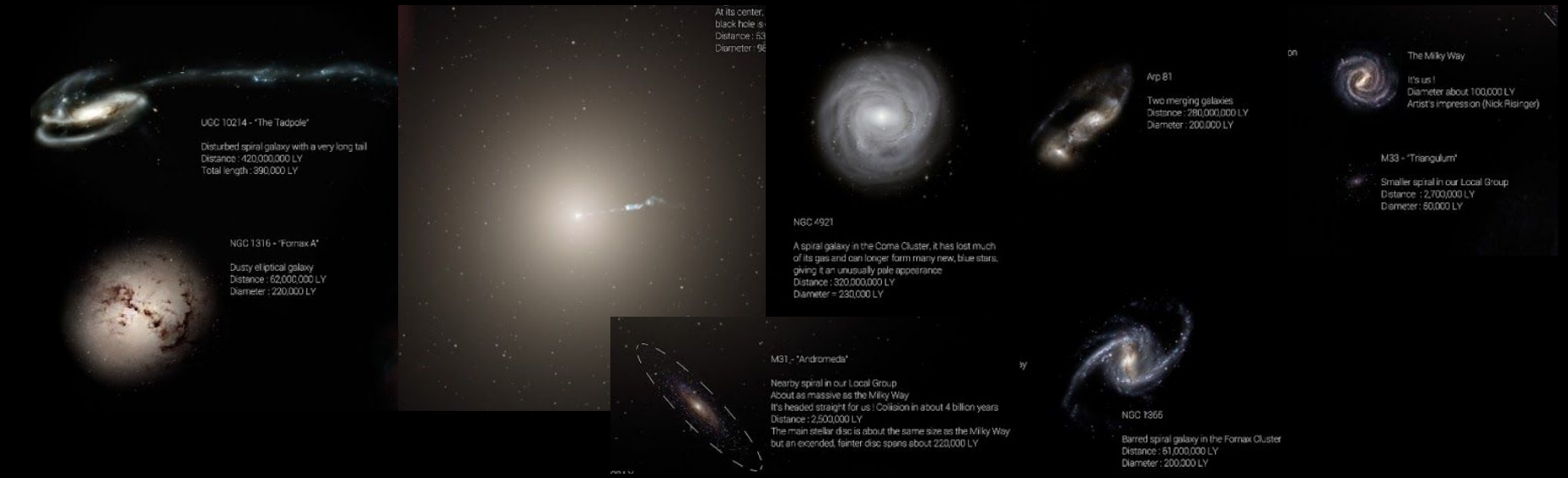


Image: Rhys Taylor

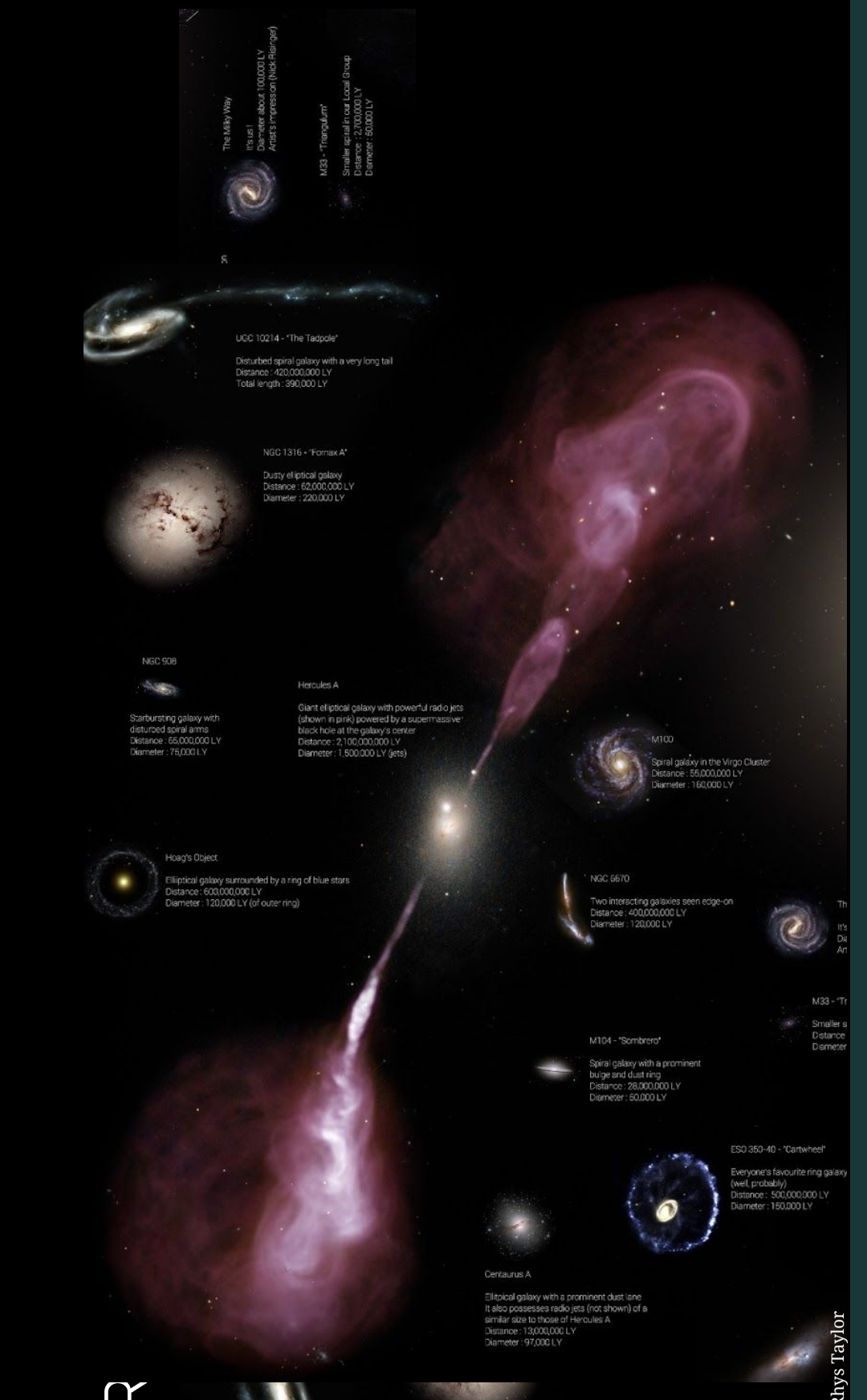


Image: Rhys Taylor

Radio galaxies are pretty big

Radio Galaxy Zoo: discovery of a poor cluster through a giant wide-angle tail radio galaxy

J. K. Banfield ✉, H. Andernach ✉, A. D. Kapińska, L. Rudnick, M. J. Hardcastle, G. Cotter, S. Vaughan, T. W. Jones, I. Heywood, J. D. Wing, ... Show more

Monthly Notices of the Royal Astronomical Society, Volume 460, Issue 3, 11 August 2016, Pages 2376–2384, https://doi.org/10.1093/mnras/stw1067

Published: 05 May 2016 **Article history** ▾

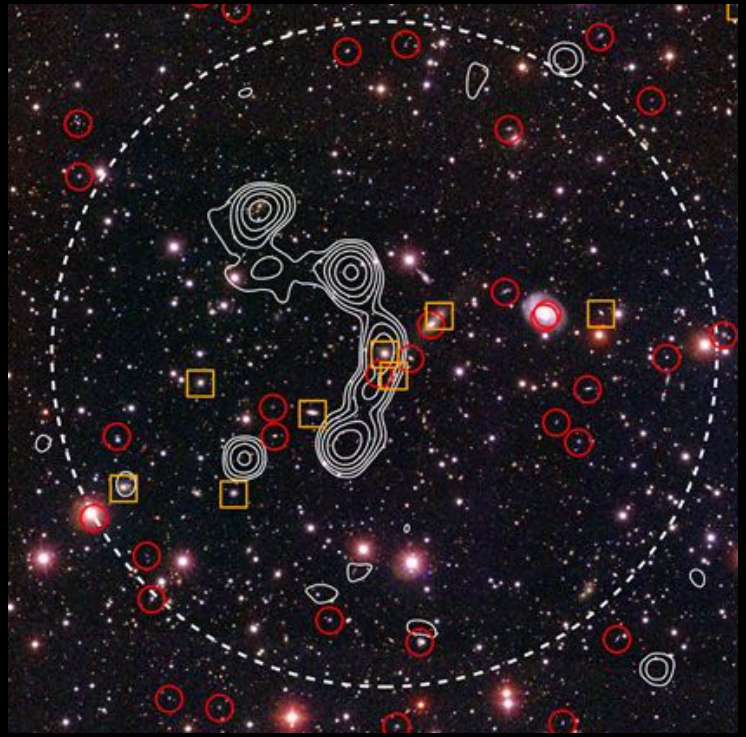


Image: Banfield+16

Cosmological alignment?

Radio Galaxy Zoo: cosmological alignment of radio sources FREE

O. Contigiani ✉, F. de Gasperin, G. K. Miley, L. Rudnick, H. Andernach, J. K. Banfield, A. D. Kapińska, S. S. Shabala, O. I. Wong

Monthly Notices of the Royal Astronomical Society, Volume 472, Issue 1, 21 November 2017, Pages 636–646, https://doi.org/10.1093/mnras/stx1977

Published: 02 August 2017 **Article history** ▾

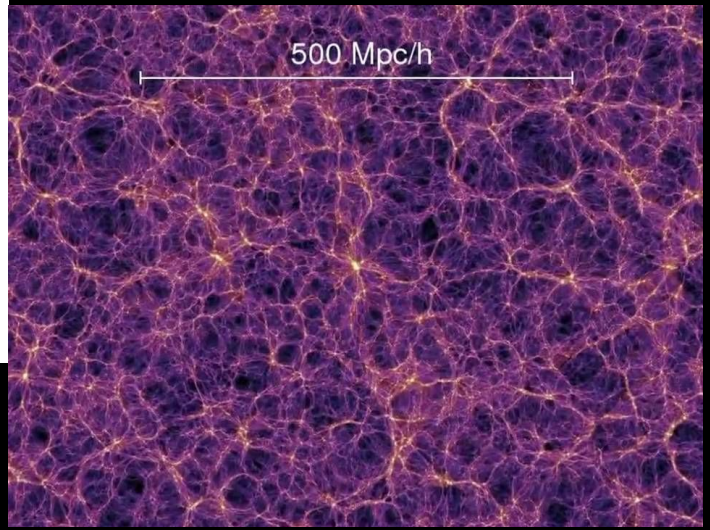


Image: Millenium simulation

Cosmological alignr

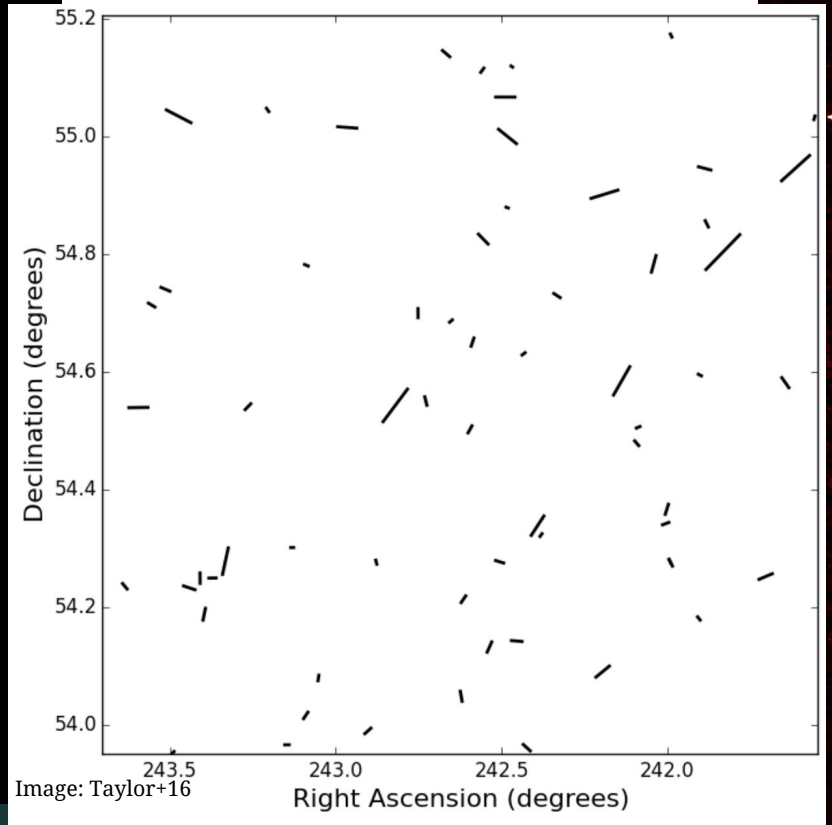
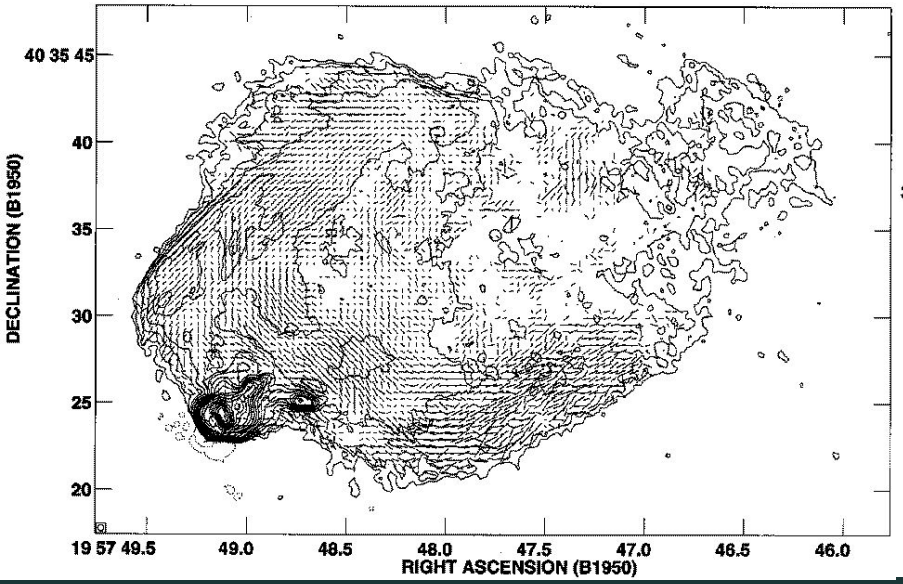
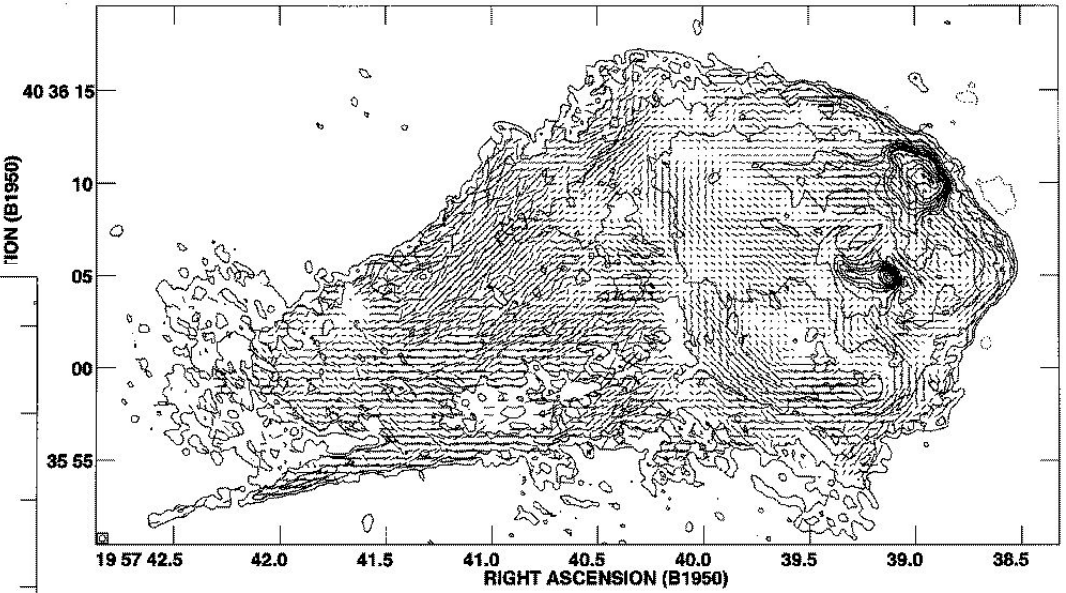


Image: Taylor+16

But what about the magnetic fields?





The SKA and Radio Galaxies