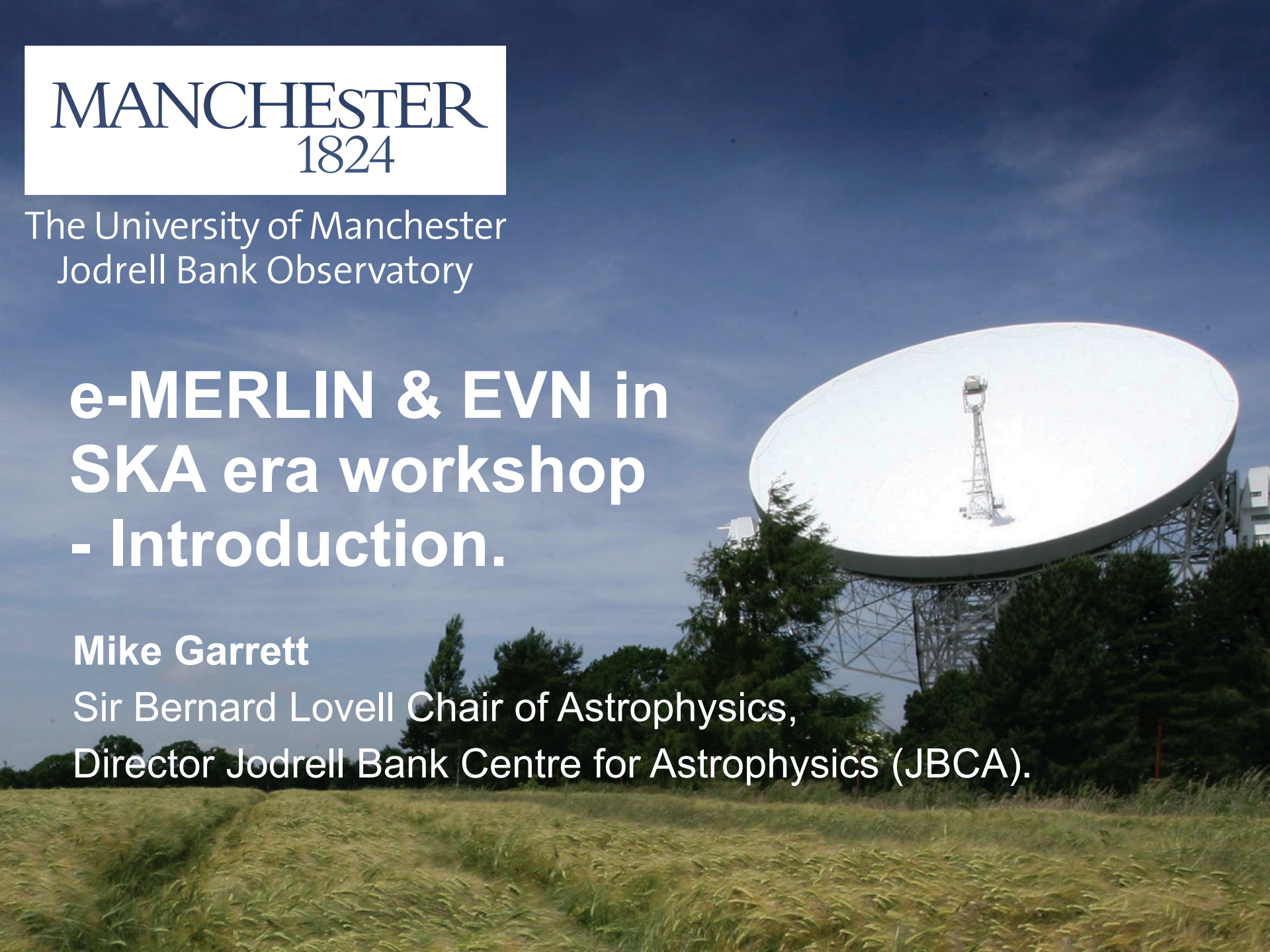


MANCHESTER 1824

The University of Manchester
Jodrell Bank Observatory

e-MERLIN & EVN in SKA era workshop - Introduction.

Mike Garrett
Sir Bernard Lovell Chair of Astrophysics,
Director Jodrell Bank Centre for Astrophysics (JBCA).

e-MERLIN Update

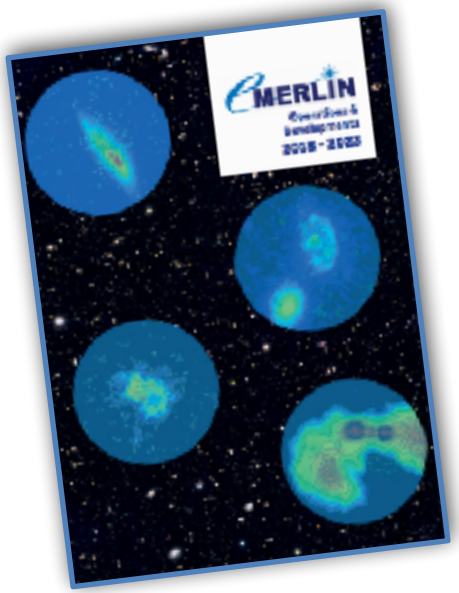
Since the last e-MERLIN workshop:

- Two proposals submitted to STFC (PPRP) on 25 April,
  - Telescope Operations (2018-2023)
  - Telescope Upgrade (2018-2023)
- Revised proposal submitted (19 May), referee comments received (21 June) and response (28 June)

PPRP Proposals

Operations proposal request £2.7m per year:

- Includes provision for 120days of LT time,
- Inclusion of Goonhilly in the array,
- Integration of e-MERLIN within EVN,
- Beam-forming of e-MERLIN+LT for PSRs.



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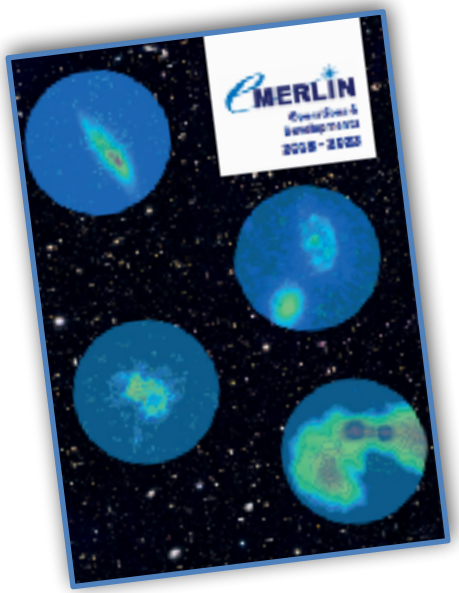
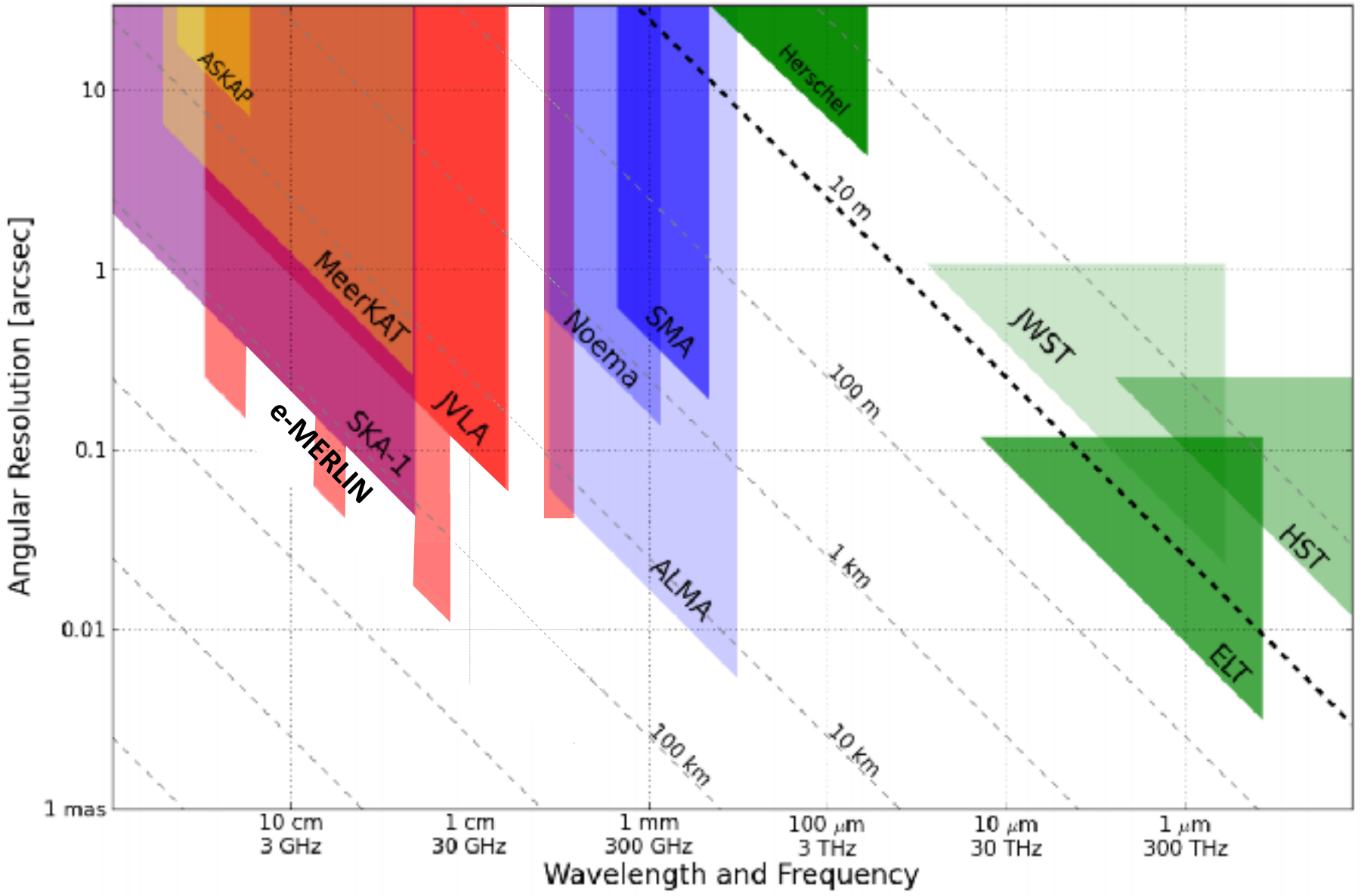


Development proposal requests £12m (total):

- S and X-band receivers (1-25GHz),
- Broad-banding ($\Delta\nu$), 2 => 8GHz,
- Replacement of Defford with SKA Antenna,
- Cooled PAF for Lovell 1-4 GHz,
- Adoption of SKA SDP s/w & pipeline environment.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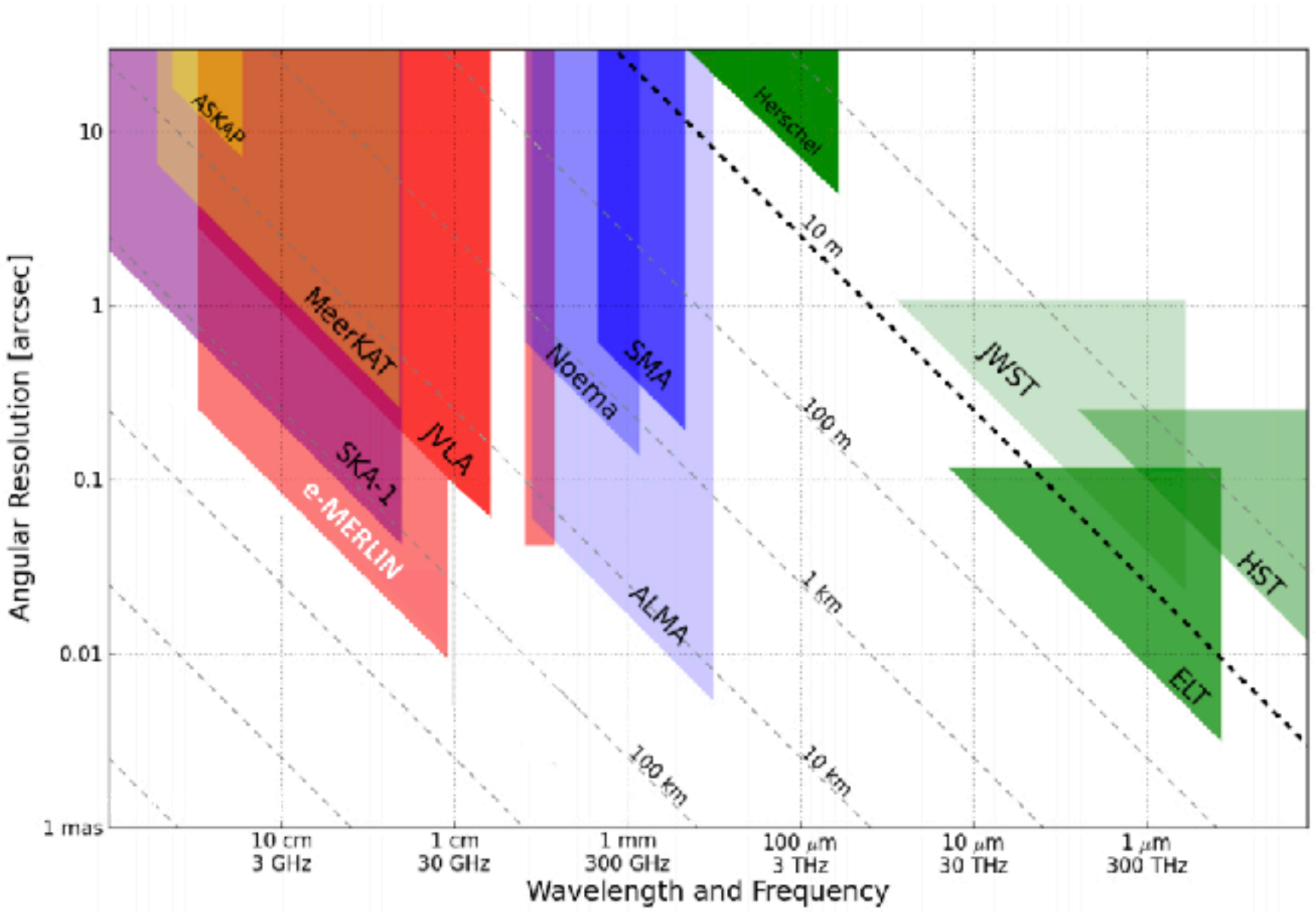
Wavelength and Frequency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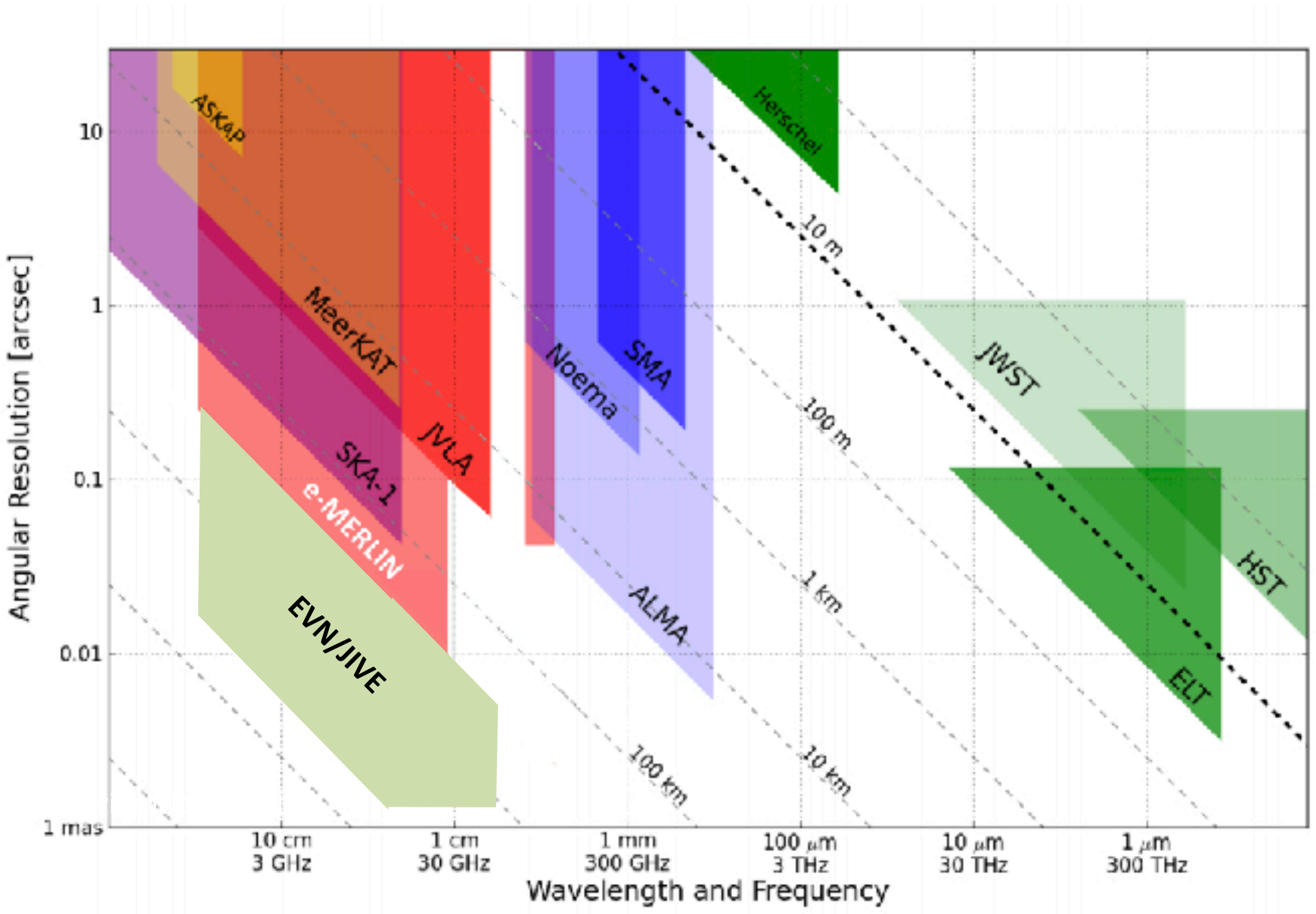
Wavelength and Frequency


Angular Resolution [arcsec]
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100 km
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3 GHz
1 cm
30 GHz
1 mm
300 GHz
100 μm
3 THz
10 μm
30 THz
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300 THz
Wavelength and Frequency

e-MERLIN Update

Meeting with PPRP panel (5 July):

- Two proposals presented (open & closed sessions),
- Responses to PPRP feedback (5 & 19 September),
- This workshop (12-13 September),

e-MERLIN Update

Radio Astronomy Review Panel (RARP):

- Balance of RA programme (e-MERLIN, EVN/JIVE, LOFAR, SKA),
- Closed session interview (8 September),
- Presentation by RARP chair tomorrow (13 September).

e-MERLIN vs SKA1-mid

Collecting area of e-MERLIN (including Lovell Telescope) is ~ 1/3 collecting area of SKA-1 mid.

e-MERLIN vs SKA1-mid

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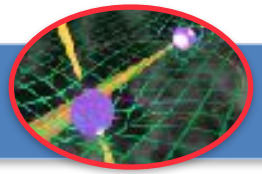
Shared software environment with Small-N, large-D presenting some clear processing advantages…

Science Case

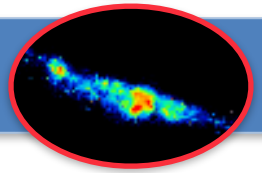
- Pulsars, Gravity & Gravitational Waves



- Time domain and Transient astrophysics

- Planet & Star formation

- Galaxy formation & evolution



- Weak & Strong Gravitational Lensing

Addressing multiple STFC key challenges, incl. a broad range of astrophysics/cosmology/fundamental physics.

SKA– Key Science Drivers: The history of the Universe

✓ Testing General Relativity
(Strong Regime, Gravitational Waves)

Cosmic Dawn ✓
(First Stars and Galaxies)

✓ Galaxy Evolution
(Normal Galaxies z~2-3)

✓ Cradle of Life
(Planets, Molecules, SETI)

✓ Cosmology
(Dark Energy, Large Scale Structure)

✓ Cosmic Magnetism
(Origin, Evolution)

✓ Exploration of the Unknown

Extremely broad range of science!

Summary

A SKA pathfinder telescope!

- 30% of the collecting area of SKA1-mid
- New receivers with broad frequency range: 1-25 GHz
- Instantaneous bandwidth of up to 8 GHz
- 10x greater FoV at lowest frequencies
- Good imaging capability (incl. equatorial fields)
- MicroJy sensitivity with superb sub-arcsecond angular resolution
- Accessible to full community - excellent user support

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An upgraded e-MERLIN will prepare, train and grow the SKA science & engineering community, ensuring UK leadership in key areas in the run up to SKA1-mid operations.

What happens next ?

PPRP Site visit on 3 October (JBO).

PPRP recommendations presented to STFC Board on 18-19 December.

RARP report presented to STFC Board on 18-19 December.

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