BRIDGING GAPS IN BLACK HOLE IMAGING: THE AFRICA MILLIMETRE TELESCOPE (AMT)

Q. Namene for the AMT Collaboration

1University of Namibia, Department of Physics, Chemistry & Material Science, Windhoek, Namibia

Email address: delightnl8@gmail.com

ABSTRACT

Supermassive black holes have been confirmed to reside in the centers of galaxies like the Milky Way, with indirect evidence supporting their existence. The Event Horizon Telescope (EHT) serves to directly image the ‘shadow’ of the black hole at the Milky Way’s centre, Sgr A*. However, there is a significant gap in coverage across Africa in the telescope network. Adding the Africa Millimetre Telescope (AMT), located at or near Mt. Gamsberg in Namibia, to the EHT could significantly improve the imaging quality of the EHT and allow for dynamical imaging.

OUTREACH PROGRAM

- Student-led outreach program with 17 student presenters
- Portable, inflatable dome (height: 2.95m, diameter: 5.90m)
- Provide immersive educational experiences in astronomy and space science
- >15,000 visitors in 2 years
- Awarded the Annie Maunder Medal 2024 for Outreach by the Royal Astronomical Society (RAS)
- Local and international support

IMAGING BLACK HOLES

Currently, without a telescope in Africa, the EHT faces these limitations:
- **Incomplete Coverage:** Gaps in geographic coverage limit the ability of imaging during the first few hours of each observation day.
- **Lower Resolution:** Shorter baselines between existing telescopes reduce the overall angular resolution of the image.
- **Gaps in UV-coverage:** Missing data points affect the accuracy and quality of image reconstruction.
- **Less Redundancy:** Fewer telescopes mean increased vulnerability to data loss from adverse weather or technical issues.

THE AMT

- AMT will increase u-v-coverage of EHT significantly
- AMT will have common baselines with all high-sensitivity telescopes for observations of Sgr A*, M87, and other active galactic nuclei (AGN)
- Simulations of full u-v-track observations show importance of AMT in EHT for imaging the shadow of the black hole of Sgr A*
- AMT can also add to Global mm-VLBI Array (GMVA)
- Mapping of molecules in the Milky Way via single dish broad band spectroscopy

REFERENCES

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