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MeerKAT monitoring of ZTF22aaajecp/AT2022cmc: the first jetted tidal disruption event in a decade

Abstract

Tidal disruption events (TDEs) are rare, multi-wavelength transients that occur when a star gets too close to a supermassive black hole (SMBH). Intense tidal forces overcome the gravity keeping the star together such that half the star is lost and the other half is accreted onto the SMBH. In a small fraction of TDEs, a highly relativistic jet is launched. There have been five TDEs in which we have observed luminous, non-thermal radio emission consistent with a relativistic jet. The most recent, AT2022cmc has been the target of multi-wavelength monitoring campaigns over the last year including high-cadence radio observations which provided the first conclusive proof that the low-frequency emission is from a highly relativistic jet. The broadband radio counterpart is slowly transitioning from optically thick to thin meaning that the low-frequency arm will continue to brighten until the self-absorption peak moves below the MeerKAT band. We are requesting continued monitoring of AT2022cmc with observations at both L and S4-band once every two months over the next term. With the proposed observations, we aim to track the low-frequency emission over the next year with a particular interest in the apparent frequency-dependent behaviour observed before the light curve peaks. The requested observations will be complemented by time with ALMA, AMI-LA and e-MERLIN, covering 1-100GHz. Combined, we aim to track the evolution of the synchrotron self-absorption break from which we will derive limits on the energetics, environment and geometry of the outflow from this supermassive black hole.