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First EVN measurements of the transient FIRST J141918.9+394036 on milliarcsecond scales

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on 18 Oct 2018; 11:36 UT
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Subjects: Radio, Gamma-Ray Burst, Transient

FIRST J141918.9+394036 has been reported as a slowly-evolving extragalactic radio transient ([Law et al. 2018, arXiv:1808.08964](#)), consistent with a fading orphan long gamma-ray burst (LGRB).

Here we report observations performed at 1.6 GHz with the European VLBI Network in real time (e-EVN) on 18 September 2018 from 12:00 to 19:00 UTC. These observations provide milliarcsecond resolution (the synthesized beam is 5.0 x 7.3 mas with a position angle of 75 degrees) with an rms noise level of 45 μ Jy/beam.

We detected radio emission with a flux density of approximately 520 μ Jy, at a best-fit position of:

ra = 14h19m18.85075(5)s
 dec = +39d40'36.0492(4)"

This is consistent in flux density and position with the source reported in [Law et al. \(2018, arXiv:1808.08964\)](#).

We constrain the source size to be approximately less than or equal to 4 mas, by using model fit in the uv-plane with a circular Gaussian. Given the distance to FIRST J141918.9+394036 of 87 Mpc ([Law et al. 2018, arXiv:1808.08964](#)), the constraint on the angular size implies a physical size of < 1.7 pc. These results will be used to help distinguish between GRB and magnetar models.

Additional technical details: The observation was conducted at a bitrate of 1024 Mbps, with a total bandwidth of 128 MHz divided into 8 IFs of 64 channels each. The total on-source time was 4.8 h. J1419+3821 was used as phase calibrator in a phase-reference cycle of 4.5 min on target and 1.5 min on calibrator. The participating telescopes were Effelsberg (Germany), Westerbork Single Telescope (Netherlands), Jodrell Bank Mk2 Telescope (UK), Medicina (Italy), Onsala (Sweden), Tianma (China), Torun (Poland), Hartebeesthoek (South Africa), Sardinia (Italy), and Cambridge, Defford, Knockin from e-MERLIN (UK).

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presented here were obtained under the project code RM015. e-MERLIN is a National Facility operated by the University of Manchester at Jodrell Bank Observatory on behalf of STFC.

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