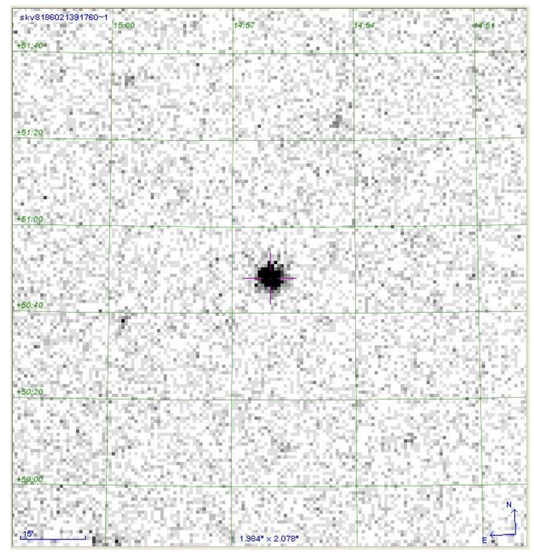
# Three in One:
# The VLBI Radio View of the X-ray Quasar RX J1456.0+5048

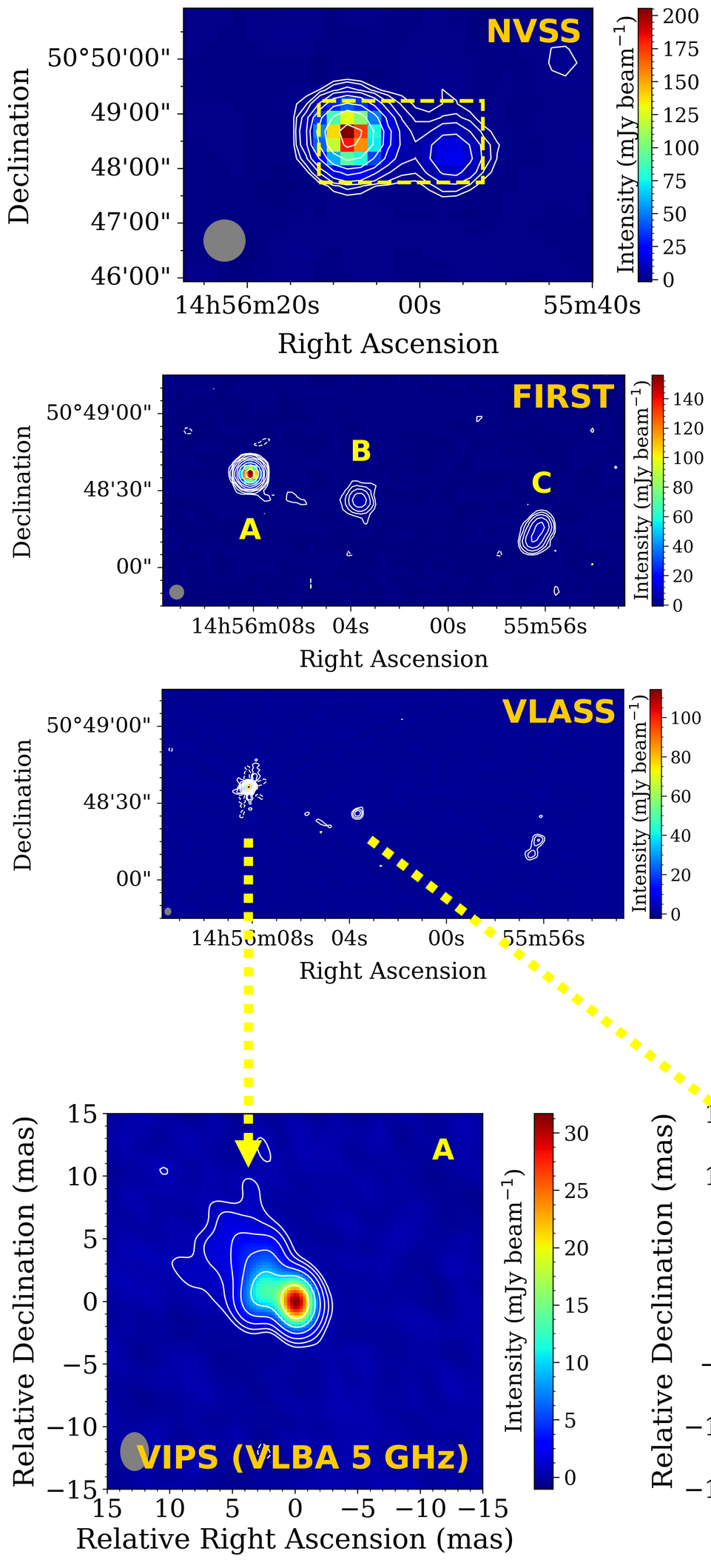
**Sándor Frey[1], Ingrid Tar[2], Krisztina Perger[1]**

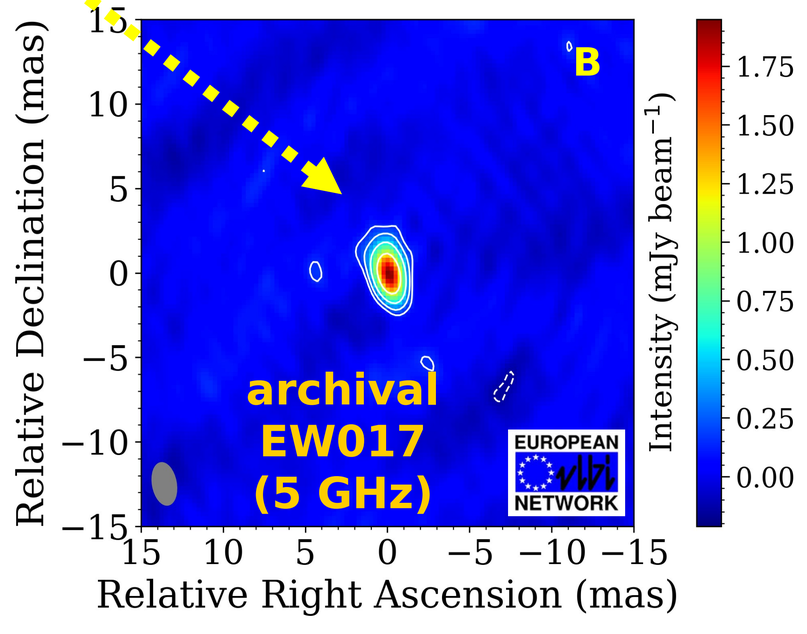
[1] ELKH CSFK Konkoly Observatory, Budapest (HU), [2] Department of Astronomy, Eötvös Loránd University, Budapest (HU)

**RX J1456.0+5048** is a prominent **X-ray source** detected already by *ROSAT*. There is a ~100-mJy level **radio emission** associated with this X-ray source. However, interferometric observations with increasing angular resolution revealed that **three distinct features** located within 2' are responsible for the measured total flux density. Whether these radio sources lining up in the sky are physically associated or just seen close to each other in projection is not immediately clear. In fact, incorrect cross-identifiction of the X-ray, optical and radio sources can already be found in the literature.

*ROSAT* All Sky Survey (Voges et al. 1999, *A&A* 348, 389) image of the source(s). The angular resolution is ~1.8'. *(Image: http://cade.irap.omp.eu)*






In single-dish radio flux density measurements, as well as in lower-resolution interferometric images (e.g. the 1.4-GHz *NRAO VLA Sky Survey* – NVSS, Condon et al. 1998, *AJ* 115, 1693; *top left*), some or all components are **blended** together.

We marked the 3 sources already resolved in the 1.4-GHz VLA *Faint Images of the Radio Sky at Twenty-centimeters* survey (FIRST, Becker et al. 1995, *ApJ* 450, 559) image as **A**, **B**, and **C**, from east to west.

These objects are also seen in the most recent image from the 3-GHz *VLA Sky Survey* (VLASS, Lacy et al. 2020, *PASP* 132, 035001). J1456+5048A is the the brightest, while **source C** is the faintest, quite resolved itself.

Unraveling the true nature of these sources from avaiable multi-band data is like a forensic work... We share some pieces of the puzzle here – join us in the investigation of the case!

Do these features belong to the **same object**? Redshift is known for the optically bright B: $z$=0.48 from SDSS DR3. If they all are physically associated, the projected linear size would be within ~700 kpc – a reasonable value for a radio galaxy.

But... What does **high-resolution VLBI** tells us? **Source A** (which is optically faint, at around the SDSS detection threshold) is a blazar-type radio source with core–jet morphology (e.g. Helmboldt et al. 2007, *ApJS* 658, 203). **Source B** is also detected with the EVN as a weak ~2 mJy source, compact at mas scale. Notably, higher-resolution X-ray data from *Swift* (D'Elia et al. 2013, *A&A* 551, A142) indicate that not A but **B is the bright X-ray source**.

It is not surprising that the source, or rather *sources* cause confusion in the literature. E.g., Nieppola et al. (2006, *A&A* 445, 441) take radio data of A and X-ray data of B in their study of blazar spectral energy distributions.

**Watch the proceedings paper for more clues!**

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