

Global Millimeter VLBI Array Survey of Ultracompact Extragalactic Radio Sources at 86 GHz

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We present results from a large global 86 GHz VLBI survey of 162 compact radio sources was conducted in 2010–2011 using the Global Millimeter VLBI Array (GMVA). For 138 objects, the survey provides the first ever VLBI images made at 86 GHz. The survey data are applied for studying jet physics down to smallest angular (~ 50 microarcseconds) and linear scales. Brightness temperature measurements made from the survey data have been applied to estimate the intrinsic brightness temperature at the jet base (VLBI core) and in the nearest moving jet components. These measurements have been modelled by a basic population scenario with a constant Lorentz factor for the entire source sample. From this modelling, the core brightness is found to be limited by the inverse Compton losses, while equipartition and adiabatic expansion govern the observed evolution of the moving jet components. Combining the survey estimates of brightness temperature with data obtained at lower frequencies, we have also studied jet acceleration on scales of ~ 100 – 10000 gravitational radii, showing that an MHD mechanism is most likely responsible for accelerating the jet plasma on these scales.