KaVA open-use monitoring of the extremely high-velocity water maser jet in G357.967-0.163

Kazuhito Motogi[1]; Naoko Matsumoto[1,2]; Tomoya Hirota[2]; Koichiro Sugiyama[3]; Kazuya Hachisuka[2]; James Okwe Chibueze[4]

[1]Yamaguchi University; [2]NAOJ; [3]Ibaraki University; [4]University of Nigeria

High mass young stellar objects in the main accretion phase are heavily obscured by a surrounding accretion envelope/disk. The innermost region is significantly optically thick at a millimeter/sub-millimeter wavelength, even for dust continuum emission. Such a self-shielding effect can set a certain limit on a high-resolution observation (< 100 AU) towards the innermost accretion system in the ALMA era. Therefore we are now focusing on a face-on accretion system where overall optical depth can be minimized. However, almost all of the known high mass objects are in nearly edge-on geometry. This is a strong observational bias, since these sources were identified by a velocity gradient of edge-on rotating envelopes and disks. On the other hand, our previous works on the archetypal face-on accretion system in G353.273+0.641 (G353) showed that very high-velocity water maser source is a good candidate of such a face-on accretion system.

In order to find-out the second G353-type face-on object, we have performed a frequent VLBI monitoring using KVN and VERA Array (KaVA) towards an extremely high-velocity water maser source, G357.967-0.163 (G357). Our immediate objective is to verify a face-on geometry based on a proper motion measurement. A compact (~ 1000 AU) bipolar jet along N-S direction was found in new VLBI data. Measured 3D motions have shown that the inclination angle of the maser jet is within 30 deg from the line of sight. This is slightly inclined compared to the case of G353 (8 – 16 deg). We also found some differences in a maser variability and velocity structure between G353 and G357, despite a quite similar evolutionary stage of the host objects. This may indicate that apparent activities of the maser jet can significantly depend on the inclination angle or there is considerable individual difference in accretion/outflow process.