S16a Intricate Ionized Gas Flows Approaching to Sgr A*

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The Galactic Center is the nuclear region of the nearest spiral galaxy, Milky Way, and harbors the Galactic Center black hole, Sgr A*. The mini-spiral is located within 2 pc from Sgr A* in projection, which is the bundle of the ionized gas streams orbiting around Sgr A*. The ionized gas streamers of the mini-spiral are seen to converge to a small part near Sgr A* in the existing telescopes. The structure of the inner part is very complicated. There have been advocated many hypotheses to explain the structures. In order to clarify the precise orbital parameters of the individual streamers, the structure of the inner part should be resolved into each streamer.

In this paper, we present kinematics of the inner part of the Northern arm (NA) and Eastern arm (EA) revealed by new ALMA observations in the H30α recombination line (ALMA#2015.A.00021.S). The angular resolution is about 0.4". We also present their resolved structures of the ionized gas streams using the kinematics. The most inner part of the EA has a very large negative radial velocity, $v_{\rm LSR} \sim -500$ km s^{-1}. This is probably the tip of the approaching gas to Sgr A*. However, the going-away gas from Sgr A* is not identified at the expected position by the orbit. On the other hand, the most inner part of the NA is identified as a curved ridge orbiting around Sgr A* in the momentum 0 map.