R22a   Astrometry of the Nuclear Star Cluster using ALMA

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Sgr A* is the nucleus of the Milky Way or the nearest (barred) spiral galaxy. It harbors a supermassive black hole with $4 \times 10^6 M_\odot$, which is called the Galactic Center Black Hole (GCBH). The IR observations in the recent three decades have revealed that there are many massive stars (almost WR and O stars) around the GCBH. They are categorized into the Nuclear Star Cluster (NSC). Their positions and proper motions probably relate to their origins. These astrometric information have been measured mainly by IR observations including IR interferometers. However, ALMA may become a "game changer" in the field of such study. ALMA has a capability of determining the relative positions even for the member stars of the NSC with the accuracy fairly better than milli-arcsecond, while the field of view of ALMA is as wide as 26" (230GHz) and 60" (100GHz). In addition, ALMA can use Sgr A* itself as the positional reference while the IR observations must rely on IRS7, which is the brightest IR star in the region, because Sgr A* is too faint during quiescent phases. In this presentation, we will present the first result of the astrometry of the NSC using ALMA (ALMA #2017.1.00503.S). Moreover, we will compare it with the latest similar observation (ALMA #2018.1.01124.S) to derive the proper motions of the member stars.