Baud's star and high-negative velocities in the Galactic center

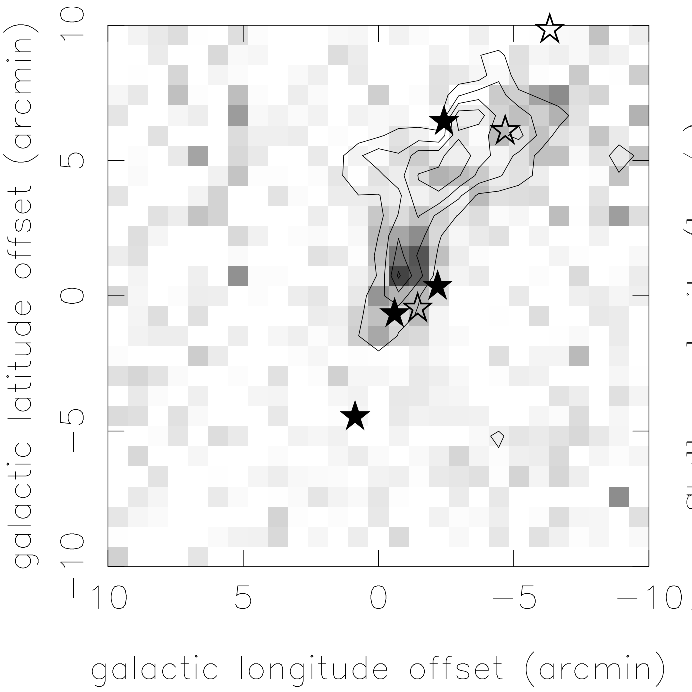
Loránt O. Sjouwerman

National Radio Astronomy Observatory, P. O. Box O, Socorro, NM 87801; lsjouwerman@nrao.edu

Almost three decades ago, in a survey for OH masers in the Galactic center, Baud et al. (1975) detected an OH/IR star with a line-of-sight velocity of -343 km s^{-1} with respect to the Local Standard of Rest, in projection 50 pc from Sgr A*, the black hole in the dynamical center of the Galaxy. Since then, at least three more high-velocity ($|V| > 250$ km s^{-1}) OH/IR stars have been found within about 25 projected pc of the Galactic center, all with a blue-shifted (negative) velocity. Actually, the high-negative velocity (HNV) OH/IR stars appear almost exactly in a line in the sky plane, even when another HNV star at -346 km s^{-1} is included (IRS 9; Reid et al. 2003). Finding significantly more, negative-only high-velocity stars in the velocity range -300 to -350 km s^{-1} clearly undermines the tri-axial bulge, bound elongated orbit HNV explanation by van Langevelde et al. (1992) as high-positive velocities have been equally well surveyed.

Over the years, several authors have also found HI, H_2CO, HCO^+, CO, and OH emission and absorption by HNV gas toward the Galactic center; gas with $|V| > 180$ km s^{-1}. Elongated in the east-west direction west of SgrA*, is in the same direction and with a similar angular scale as the alignment of the HNV OH/IR stars. However, none of the authors directly related the observations of the HNV stars and the HNV gas.

This contribution attempts to explain the observations of the HNV OH/IR stars by relating their remarkable spatial and kinematic alignment in the inner 25 pc to the observations of the HNV gas and with a model of an infalling cloud on an inclined hyperbolic orbit by Zhao et al. (1995) and Roberts et al. (1996).



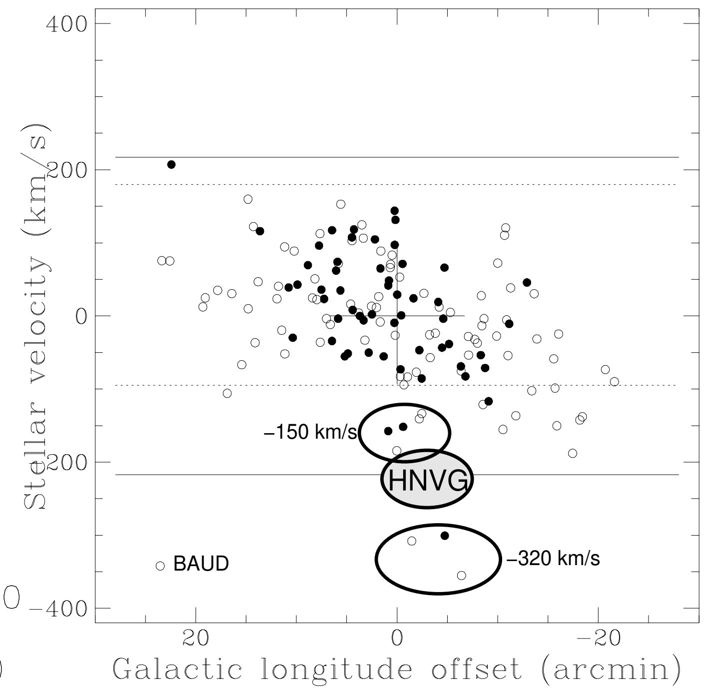


Figure 1: (left) Galactic sky distribution of HNV OH/IR stars and HNV gas. The HNV stars at a velocity of around -320 (-150) km s^{-1} are the open (closed) symbols on top of the HNV gas. Baud is at [20.0′, −10.9′].
Figure 2: (right) Apart from Baud's star, the spatial and velocity structure of the HNV gas nicely fits into the Galactic velocity distribution of HNV OH/IR stars between the -320 km s^{-1} and -150 km s^{-1} groups. Taken and modified from Sjouwerman (1997).