

VERA astrometry of post-AGB stars including a “water fountain” source
「宇宙の噴水」を含む後漸近巨星枝星水メーザー源のVERAアストロメトリ

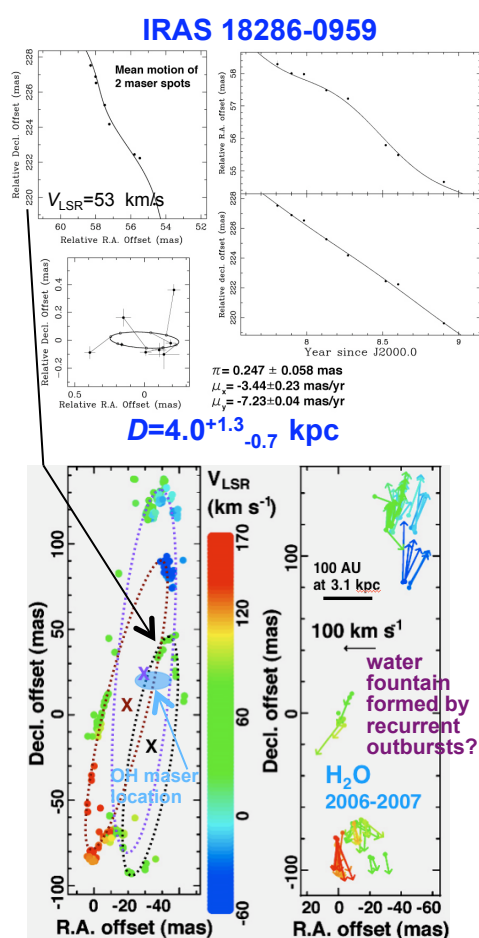
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Introduction: about target stars, **IRAS 8286-0959, K3+35, IRAS 19312+1950**

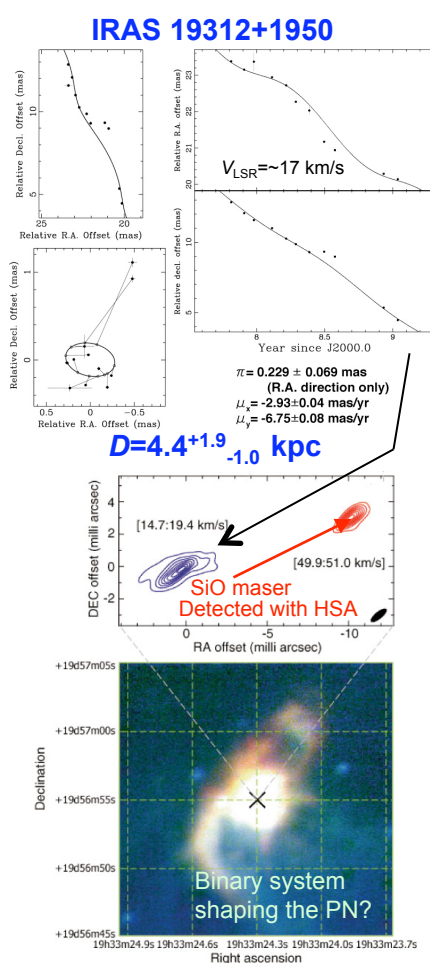
- **water fountain (stellar molecular jet), planetary nebula, and pre-planetary nebula sources, respectively**
- **Elucidating distances and physical parameters of water fountain sources and pre-planetary nebulae** (molecular/ionized jet lengths/speeds, stellar mass) $\Rightarrow$ **In order to track stellar evolution and to find out jet launch**
- **Elucidating kinematic property**
orbital motion caused by a binary system? peculiar secular motion attributed to parental star formation scenario?
- **Urgent astrometry:** lifetime of each maser region $t < 100$ years (c.f. Imai et al. 2008)

Table: Parameters of the targets and VERA astrometry.

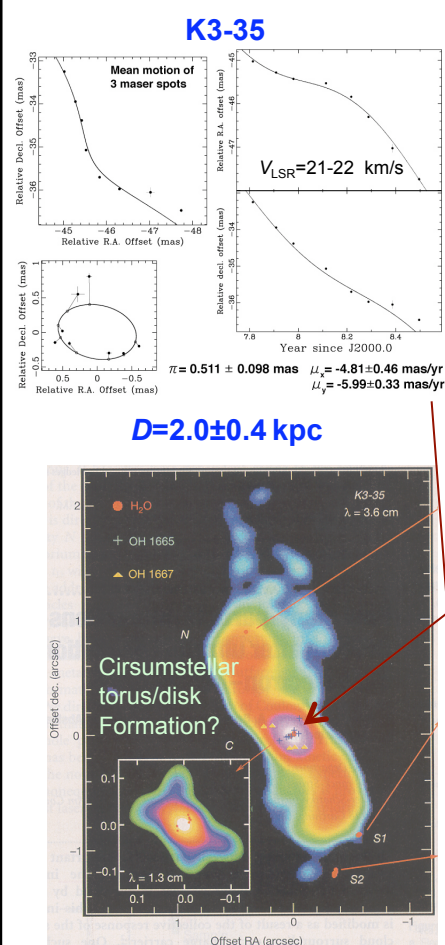
Target	I_{maser}	N_{feature}	Identified duration	Reference source	I_{ref}	θ_{sep}	Π [mas]
IRAS 18286-0959	~15 Jy/beam	100—200	07Y296DOY—08Y329DOY	J183220.8-103511	~0.1 Jy/beam	0°.67	0.25
K3-35	2—10 Jy/beam	1—2	07Y296DOY—08Y142DOY	J192559.6+210626	0.7—1.1 Jy.beam	0°.57	0.23
IRAS 19312+1950	3—6 Jy/beam	1	07Y296DOY—09Y013DOY	J193510.4+203154	0.3—0.4 Jy.beam	0°.72	0.51



H₂O (VLBA) & 1612MHz OH (EVN)
(Imai et al. in preparation)



H₂O (VLBA) & J,H,K-IR (SUBARU)
(Nakashima et al. in preparation)



H₂O, OH, continuum (VLA)
(Miranda et al. 2001)

Discussion

- Distances significantly improved: 3.1 to 4.0 kpc, 3.0 to 4.4 kpc, 5.0 to 2.0 kpc, respectively
- Stellar classification should be reexamined (PPN to YSO for IRAS 19312+1950?).
- Systemic motions roughly parallel to the Galactic plane: high mass single parental stars?