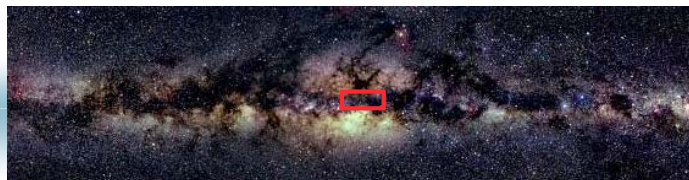


「銀河系研究会2006」：
SiO Maser Survey of the Inner
Bar of the Galactic Bulge

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秀行（岡山）、亀谷収（水沢）、中田好一（東大）、
宮崎敦（上海天）、その他

観測の目的

- ▲ 内部棒状構造のSiO maser源の探査
($6^\circ \times 2^\circ$) CO, CS ガス
- ▲ 視線速度から、速度構造。AGB星 Gyr
- ▲ これまでのIRAS源では不完全
- ▲ 2MASS and MSX の新しいカタログ
- ▲ 星の軌道 動力学

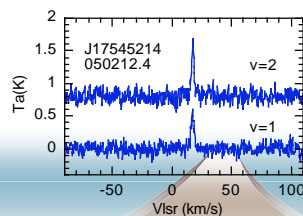
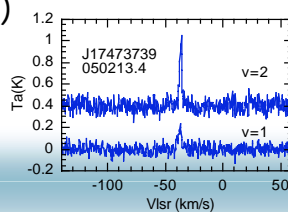
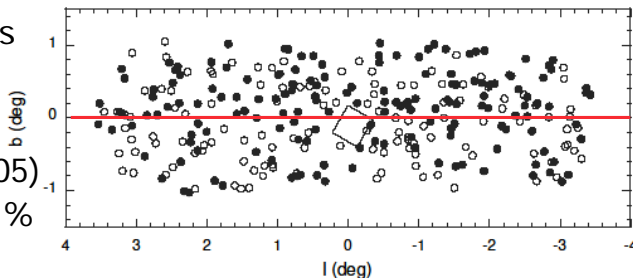


Spitzer image (1.9x1.4 deg, 3.6-8 μ m)



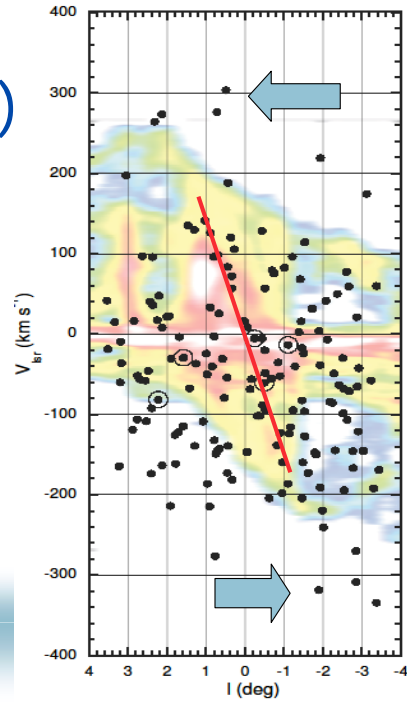
2004/5年観測まとめ

- ▲ 観測 100+79 hours
- ▲ 日程：20+16日
(2--5月)
- ▲ 観測可能時間 (2005)
50 h / 79h = 63 %
- ▲ GC: 291 objects
163 detections (bias)
- ▲ Except central 30'
(180/~400)
- ▲ Deguchi et al. 2004
PASJ 56, 261

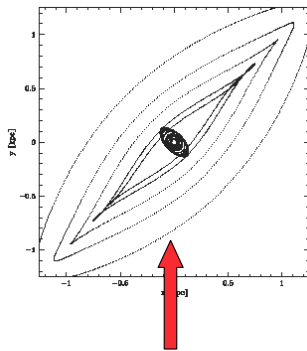


L-V diagram (overlay CO map)

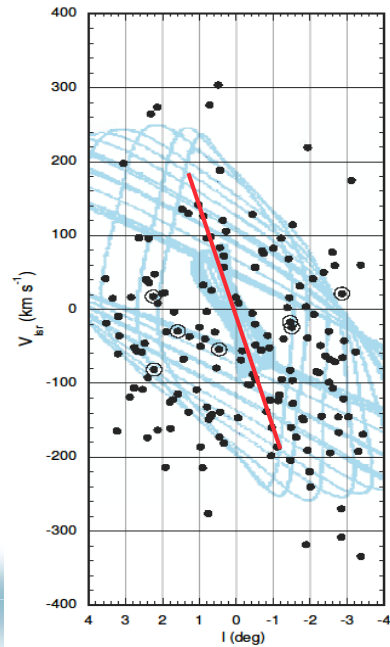
- s 1. 全291/163検出
- s 2. High-velocity stars
- ▲ $|V_{lsr}| > 250$ km/s
- ▲ 3. Inner Bar
- ▲ 4. No parallelogram
- ▲ 5. x_1 and x_2 family orbits



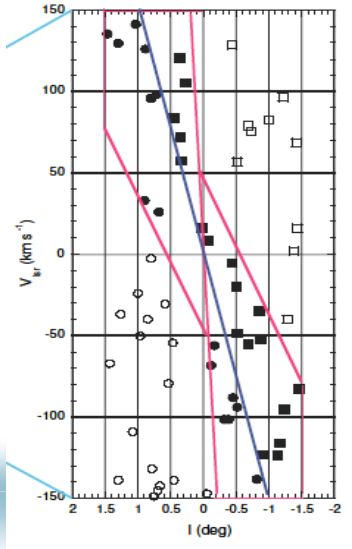
Bulge bar 平面図



- ▲ X1 orbit feature
- ▲ X2 orbit feature (extended)
- ▲ Gasはこれで説明
- ▲ 星は？



Inner Bar Objects

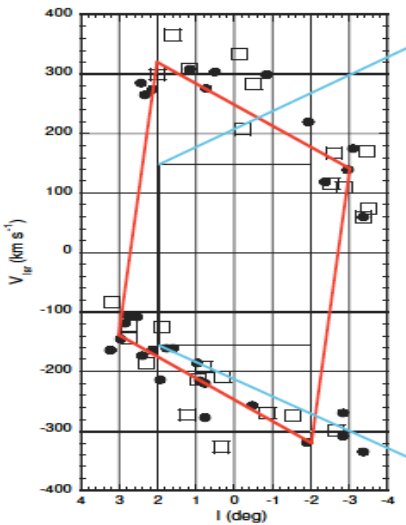


- ▲ |b| 分布
- ▲ x1 $\langle |b| \rangle = 0.53 \pm 0.27$
- ▲ x2 $\langle |b| \rangle = 0.40 \pm 0.31$
- ▲ 90% 有意

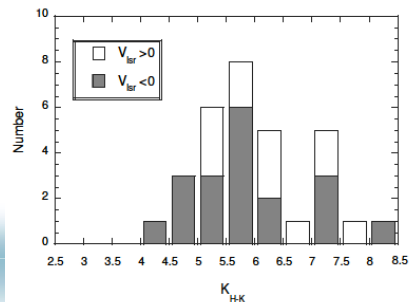
- ▲ G1. $K_c = 5.27 \pm 0.97$
- ▲ G2. $K_c = 6.00 \pm 0.13$
- ▲ G3. $K_c = 5.56 \pm 0.84$
- ▲ G4. $K_c = 5.77 \pm 1.02$
- ▲ G1:G2 90% 有意

▲ where $K_c = K - 1.4[(H-K) - 0.5]$

High-Velocity objects

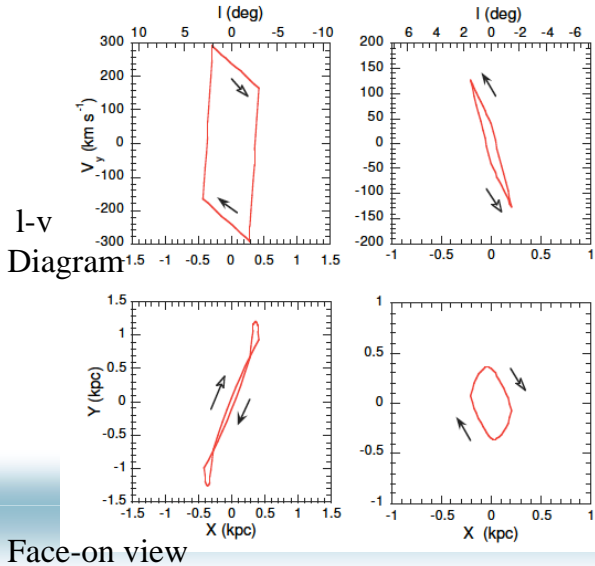


- ▲ X 1 統計検定 70%
- ▲ $V > 0 : V < 0$
K mag ?
- ▲ (R < 15' 有意)



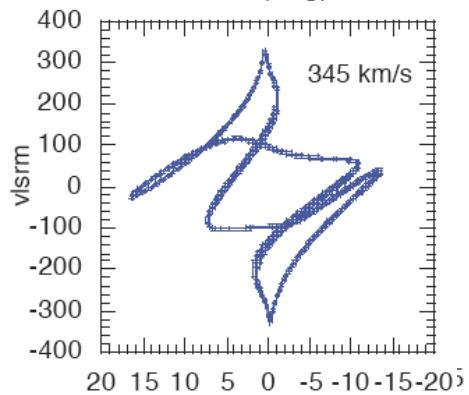
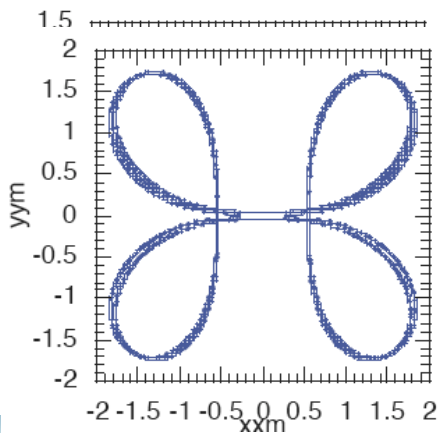
Stellar orbit

outer bulge inner bar

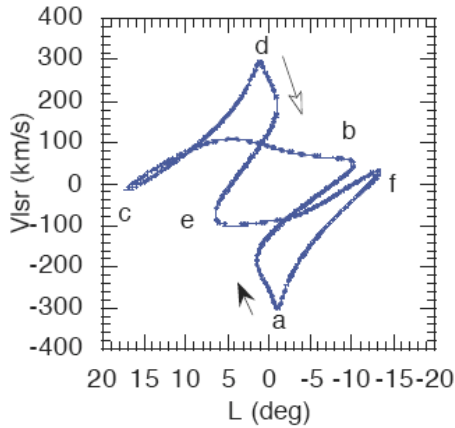


- ▲ Self-Crossing orbit -> high velocity objects
- ▲ X2 orbits
- ▲ --> extended feature (~150 km/s)
- ▲ Bias not free

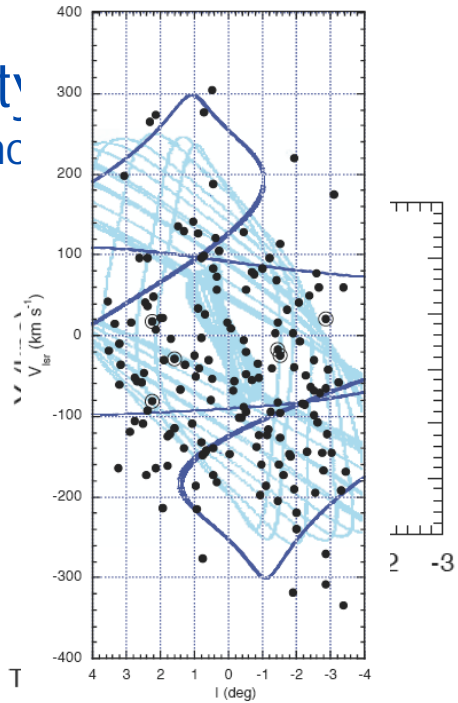
High Vel. Stellar Orbits



High Velocity (4:1 resonance)



model $v=321.3$ km/s and $r_0=0.15$ kpc. T

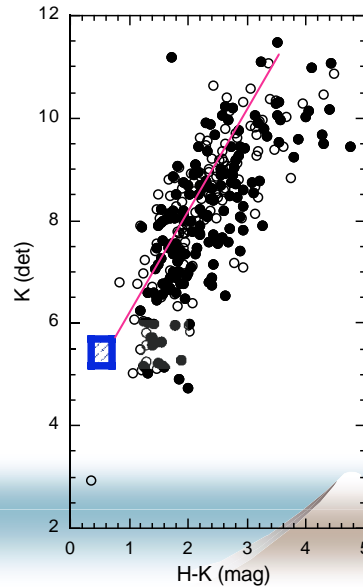


結論

- ▲ 1. 2004-2005長期共同利用で
291 MSX/2MASS ($|l| < 3.5^\circ$, $|b| < 1^\circ$)
163 detections 視線速度を得た。
- ▲ 2. 星の x_2 family orbit --> inner bar
- ▲ 3. 高速度星: self-crossing x_1 (4:1) orbits

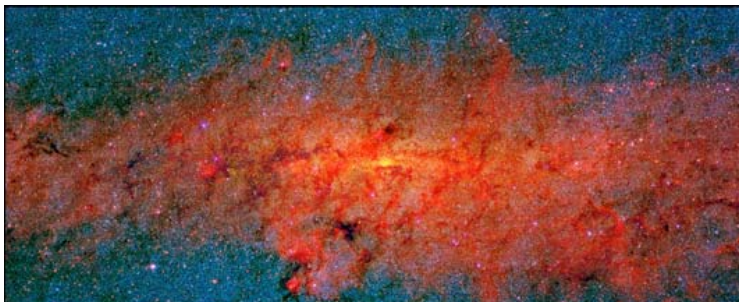
Corrected K magnitude

- ▲ $K_c = K - 1.4[(H-K) - 0.5]$
[Nishiyama et al. 2004]
- ▲ Interstellar & circumstellar extinction
- ▲ Re-emission not considered



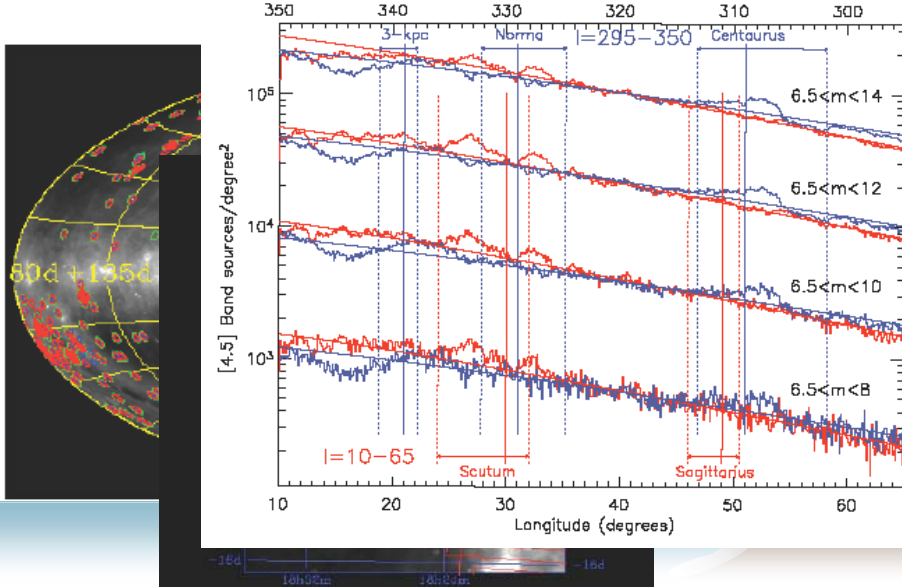
2MASS+MSX images

- ▲ $\sim 4^\circ \times 1.5^\circ$



Spitzer Glimpse Result

Astron-ph/0508275 Benjamin



gravitational potential (rotating system) Engelmaier & Gerhard 1999

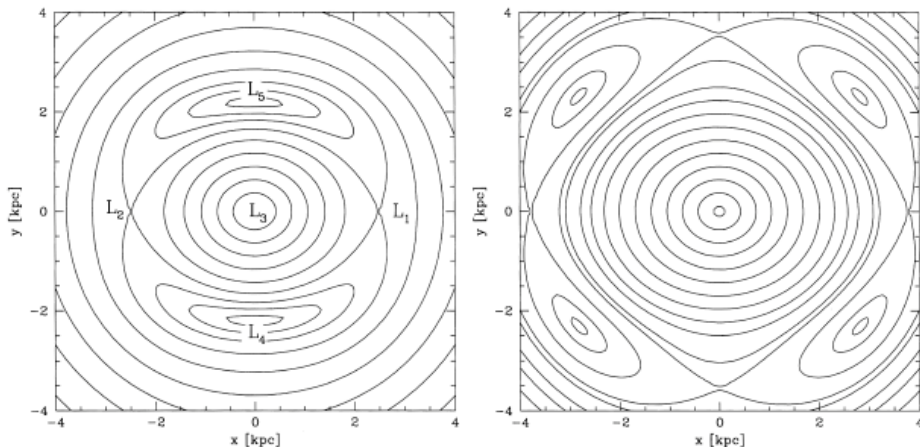


Figure 5. Left: effective potential in the standard $\phi_{\text{bar}} = 20^\circ$ bar model for $\Omega_p = 80 \text{ km s}^{-1} \text{ kpc}^{-1}$, showing the usual four Lagrangian points in the corotation region. Right: For $\Omega_p = 55 \text{ km s}^{-1} \text{ kpc}^{-1}$. Because the mass peaks in the disc $\sim 3 \text{ kpc}$ down the minor axis of the bar now contribute significantly to the potential near the increased corotation radius, there are eight Lagrangian points near corotation for this pattern speed.