Chasing the Galactic structure using VLBI and Gaia

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Bessel S269:
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BAaDE survey:
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Gaia:
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Keith Tirimba (Florida)
Synergy between Gaia and radio campaigns
BeSSeL Survey

Bar and Spiral Structure Legacy Survey

PI: M. Reid (CfA) and K. Menten (MPIfR)

• Masers in ~250 HMSFR:
  • \( \text{H}_2\text{O} \) (22 GHz)
  • \( \text{CH}_3\text{OH} \) (6.7 & 12 GHz)
• 6D with ~10µas accuracy
• Study the MW’s spiral structure & kinematics
• ~5000 hours over 5 years

Reid+2014 (>700 citations)
Synergies with Gaia

• Stellar Associations

S269

π = 0.241 ± 0.012 mas

Quiroga Nunez+2019

Quiroga-Nunez in prep.
Synergy between Gaia and radio campaigns

BAaDE Project

13th NM 02/19/2020
BAaDE project  Bulge Asymmetries and Dynamic Evolution

PI: Y. Philström (UNM) and L. Sjouwerman (NRAO)

• Mira stars -> SiO masers
• IR selection based on MSX
• \(|b| < 5^\circ\)
• 29,000 targets:
  • VLA 19,000 observed!
  • ALMA 2,300 obs. + future Cycles
BAaDE project

Poster Megan Lewis

YSO, Carbon, Oxygen rich stars

Poster Brandon Medina

SED fitting for AGB
BAaDE targets without Gaia counterpart correlates with high extinction regions.
Characterizing AGB population around the Sun

- BAaDE: 28,000 targets
  - 15,000 in 2MASS & Gaia
    - False positives!
  - 2,000 good distance
Work in progress: characterizing population

- **BAaDE**: 28,000 targets
  - 15,000 in 2MASS & Gaia
    - False positives!
  - 2,000 good distances
  - 50 SiO masers
  - 100% Mira in *Gaia*

Quiroga-Nuñez et al. in prep
Future

• Young massive stars (Spiral Structure)
  • Search for optical companions to confirm stellar associations.
  • New Southern telescopes can improve VLBI in HMSFRs (pre-SKA).

• Evolved stars (Inner Galaxy)
  • Study of evolved stellar populations in the Galactic Plane
  • SiO masers on VLBA (time allocated)
  • Supporting technique for Gaia

BeSSeL simulations featured on the SKA calendar on display in dr. Koothrappali’s office Quiroga Nuñez+2017

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