Astrometric observation is an only way to derive 6D phase information of the astronomical object. The 6D phase information can be crucial for resolving a wide variety of astronomical mysteries. Indeed, VLBI astrometric results have drastically improved our understanding of the Galactic structure (e.g., Reid+09; Honma+12; Reid+14).

From 2000s to 2030s, VLBI, Optical, and IR astrometric observations are available (see the upper figures), which allow us to tackle a wide variety of astronomical mysteries.

- **Galactic shock?**

  - **Exterior**
  - **Interior side**
  - Sun

  - NEW (VERA)

  NEW VS OBSERVATION

  - Shock model vs Observation

  - Interior side
  - Exterior

  Distance perpendicular to the Perseus arm (kpc)

  Radially inward motion (km s\(^{-1}\))

- **Fingerprint of a satellite galaxy?**

  Y1 axis: Vertical height, z (pc)
  Y2 axis: Vertical velocity, W (km s\(^{-1}\))
  X axis: Distance from the center (kpc)

  Vertical velocity, W (km s\(^{-1}\))

  Distance from the center (kpc)