



# The Ecliptic Radio Sources Densification Using Phase- Referencing Technology

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- Background
- quasars distribution around the ecliptic
- Our plan
- The progress

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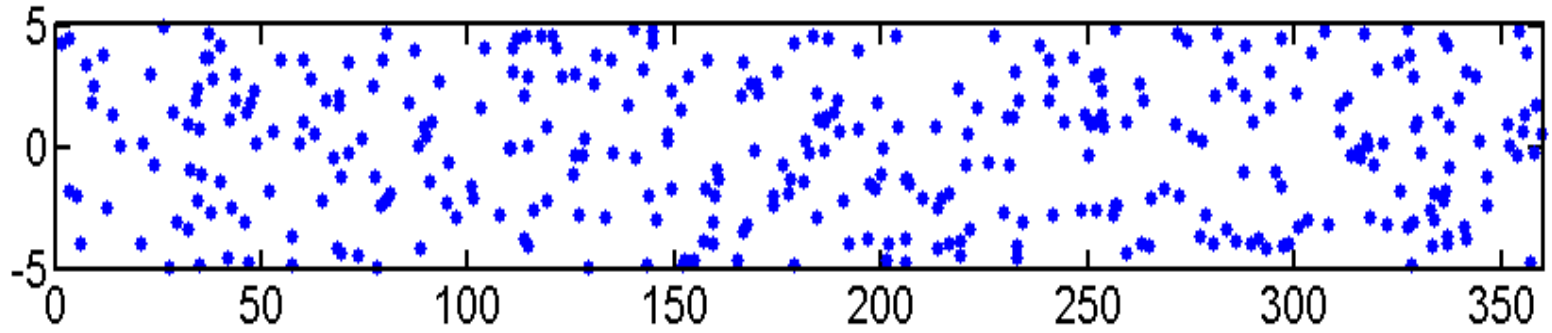
# Background

- The ecliptic is an important solar system reference plane. The most main planets are close to the plane, and their geocentric ecliptic latitude is within  $\pm 5^\circ$ , and the most deep space exploration is limited in this area as well.
- The VLBI is getting more involved in S/C navigation, and the phase-referencing between S/C and quasars is an effective way to reduce the many of observation error sources.
- We are preparing to densify the radio sources in  $\pm 5^\circ$  ecliptic belt to having one source within  $5^\circ$  at the precision of  $\sim 0.5\text{mas}$

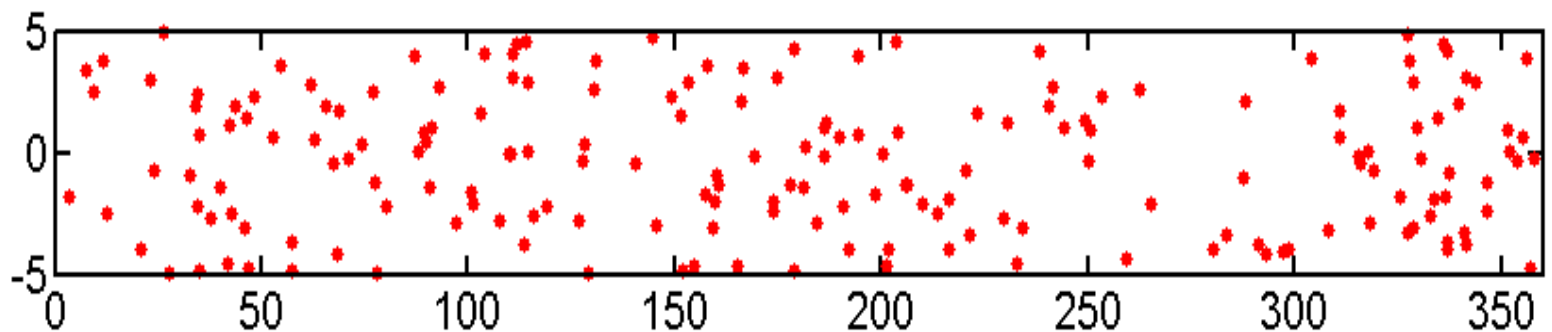


# The Distribution of the ecliptic quasars: ICRF2

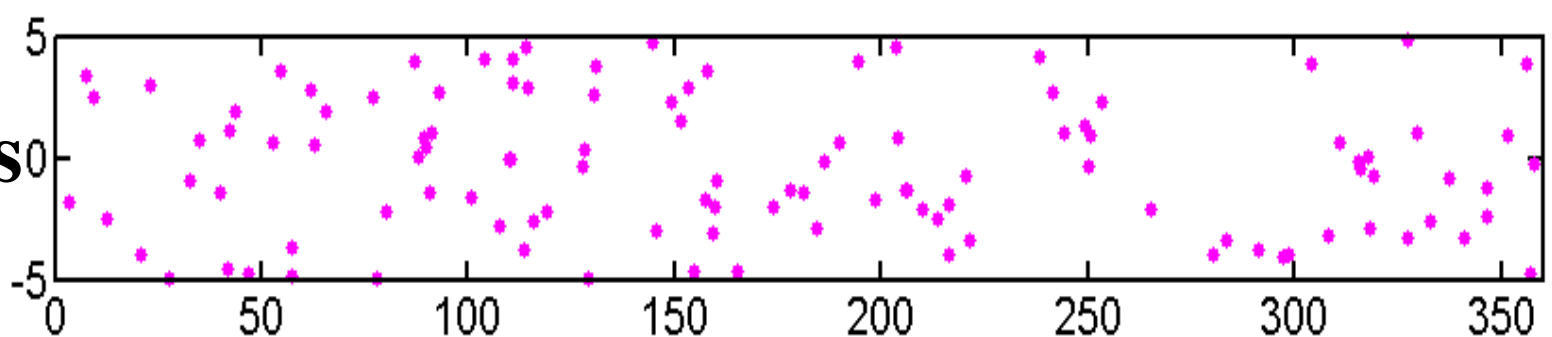
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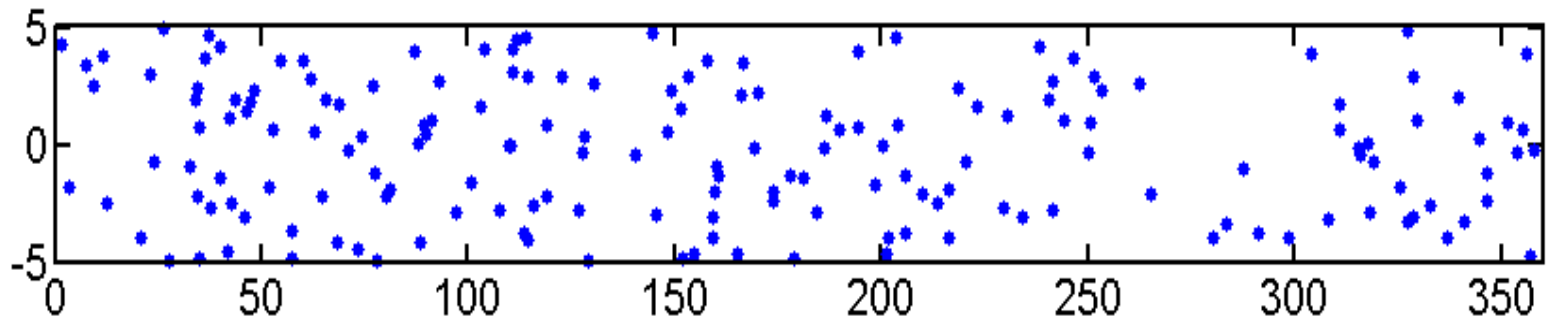
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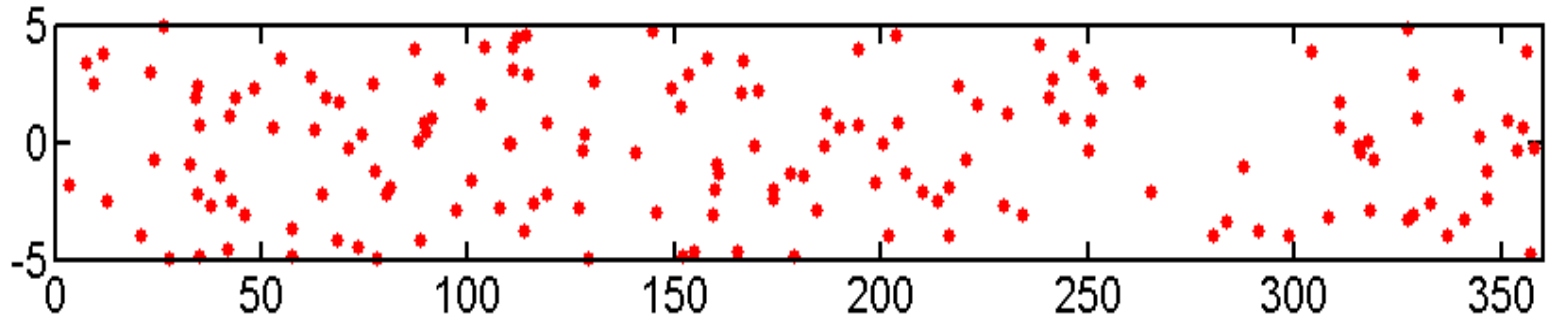


# The Distribution of the ecliptic quasars: VLBA Calibrator ( $>100\text{mJy}$ )

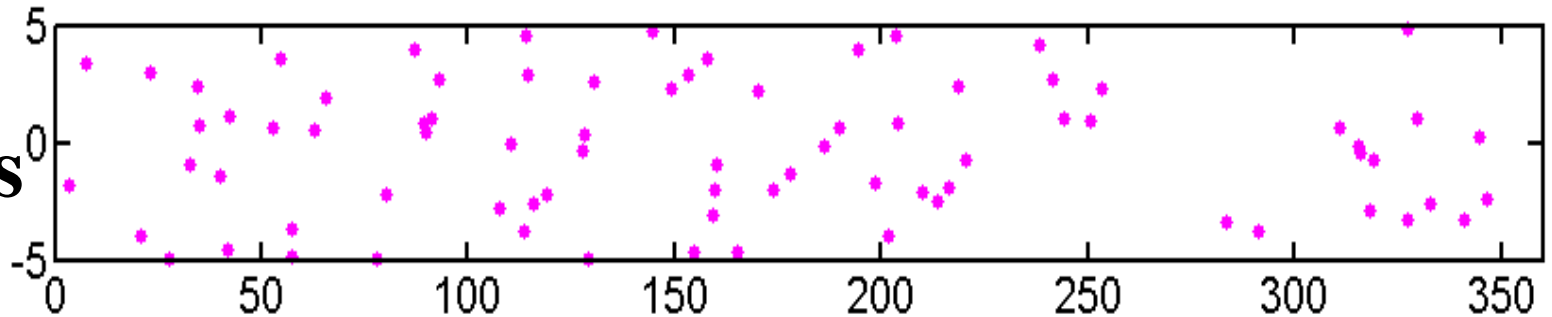
**All**



**$<1\text{mas}$**



**$<0.5\text{mas}$**





# The planned working procedure

We plan to adopt phase-referencing to do this work.

1. Validation of the phase-referencing, the post-correlation processing of this kind of observation.
2. Analysis software development for the differential VLBI observables.
3. The choice of the candidate well observed sources and the source positions possibly can be improved.
4. The Routine VLBI experiments and data processing.



# The Current Progress(1/3)

- We are just at the start.
- Last November we've carried two 20-hour CVN phase-referencing experiments. I would be here to talk about the results, but the post-correlation processing coding work of phase-referencing is not easy than I expected. I'll just introduce the experiments considerations.

# The Current Progress(2/3)

- The experiments were set up using 4S+4X, 8MHz bandwidth with ABBC and DBBC recorded simultaneously.
- The switching time 2minutes
- the quasar pairs are designed different with strong-strong, strong-weak, weak-weak.
- The separate angle of quasar pairs is from less  $1^{\circ}$  to more than  $10^{\circ}$  。





# The Current Progress(3/3)

- By this kind of experiments schedule, we try to learn the capabilities of the phase-referencing and of our observing system, the proper data processing method.
- We'll get observables, single band delay, phase, multiband delay, phase, and the phase-referenced SBD and MBD respectively, we also plan to check the possibilities to get phase-referenced phase delay.
  - The strong-strong pair is used as check
  - The larger angle separation is to find the limitations
  - The similar work has been done before. Shapiro, et.al @ 1970s, VLBA summer school, and some other papers.



Thank you  
for your attention!

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