Minutes

G24.33-0.14

A 22 GHz Water maser flare is occurring in several velocity features.

Discussion focused on the likely scenarios based on the data and what is already known of G24.33-0.14. The pre-flare spectrum of the brightest component at +125 km/s showed a 'shoulder' feature which then flared. Similar shoulders have been seen in other maser superposition flares (such as G25.65) however this makes it difficult to explain the fact that many other masers are flaring. The 22 GHz 125 km/s feature is known to reside near the center of the 6.7 GHz methanol maser distribution (we know from our recent VLBA results taken in response to the 6.7 GHz flare which occurred about 900 days ago [Kobak et al. in prep]) so there is reason to beleive that the current water flare could be the result of a reduction in the quenching IR photons. This is further supported by the IR light curve being historically shown to vary at the same time scale as the 6.7 GHz methanol flares (~8 yrs). Another possibility is a new jet shock which formed following enhanced accretion associated with the 6.7 GHz flare. New IR data, in addition to mapping the location of the water maser with VLBI and VLA, and checking if the radio spectral index indicates evidence of a jet - will help determine what is going on.
The water maser seems to be located in the disk, rather than an outflow. Following up this flare therefore is a good opportunity not only to better understand the pumping (or un-quenching) of water masers by radiation but also its a chance to get more info about what actually caused the 6.7 GHz flare of 2019. Which is still somewhat uncertain.

What to do next:
Propose multiband VLA with the motivation of getting the spectral index of continuum emission in addition to imaging the water masers. The VLA is in its extended configuration so this is good timing for high resolution imaging. Observations can be conducted as part of the accepted triggerable ToO proposal (Bayandina et al)

Propose a VLBA DDT (our VLBA and EVN trigger ToO proposals have focused on 6.7 GHz, we usually do K-band triggers with KaVA/EAVN however VERA will be in maintenence from June 1st so this is not an option). Ross will write a DDT.

OISTER observations at NIR can be proposed to Ooasa-san who today introduced the OISTER project for which she is PI. OISTER and M2O are forming closer collaborations. Requests for follow-up NIR observations can be made by email (yumiko.oasa <at> mail.saitama-u.ac.jp). Monitoring G24.33 at NIR could help to test whether the water flare occurs due to a reducing IR radiation field.

In addition to imaging studies we should pursue high sensitivity (Effelsberg) spectra (Maybe Andrey will lead this?)

Staying on the topic of G24.33 Hirota-san introduced the latest revisions to the G24.33 ToO ALMA paper. The paper has been refined and will be re-submitted very soon. Please check your affiliations.

G358.93-0.03 Single Dish:

One velocity feature at -15.95 km/s of the 6.7 GHz methanol maser has increased flux from 10 to 15 Jy according to Ibaraki monitoring. This needs to be confirmed by other stations. Tr and Hh will look to confirm.

Conferences:
EVN: Many of us will attend the EVN symposium but many are not sure if they will attend in person or over zoom.

IAU Maser symposium Kagoshima: The circular will be distributed shortly. Currently the plan is hybrid of on-site and online participation options, depending on the Covid situation. The M2O will likely feature strongly there and we are looking forward to welcoming you to Kagoshima (it is my 'hometown' in Japan and a totally wonderful place to visit).

M2O Conference: Will be a ~5 day event with days themed on topics. The time of day will be staggered throughout the conference so that all countries can participate. Days on topics that have a strong US interest will be scheduled with preference for US timezones. Online participation. More details and a doodle poll for a shortlist of dates will be sent out soon. The general consensus is to hold it at least a week after the EVN symposium so we can rest a little.

G358-MM1 VLBI paper discussions:

Many comments on the paper have already been sent (thank you!) and some common concerns have shown up which need addressing. Figure 2 (showing the spot map and the 4 arms determined at a much later part of the paper) should be changed to not show the arms, or to include more robust evidence of the arms (such as the 2D correlation plot) included. Basically a combination of Fig2 and Fig6. Either that or just a raw spot-map with no arms to avoid guiding the eye.

Andrey pointed out that several of the which masers diverge from Keplerian rotation are likely not in the disk plane and are instead above it or in the outflow cavity. These data should be identified and filtered out when attempting to analyse the disk. This can be done by iterating fitting and filtering cycles. Super-Keplerian

motions (predicted to exist) should also be checked.

I mentioned that there are still some further refinements that Jay and myself are working on with the 2D cross-correlation work and we hope to get a detection criteria based on the cross-corr coefficient in the 'peak-free' regions of the Azimuth space. Also smoothing to avoid the spiky-ness of the cross-corr vs Az plot which comes from the data points (maser spots) being delta points. These will appear in the next draft, along with:

More details in the methods, with specific focus on null rejections and searching the parameter space more widely to show that the final arm model is (Lucas:) better than what can be fit to random noise data, and (Job:) gives a better fitting result than other combinations of parameters to test the uniqueness of the fit. These are not difficult tasks but would add a lot more certainty to the claims in the paper. Therefore certainly worth doing.

Was really great to see and hear you again.
Catch you again soon.
Kind regards
Ross