

6. Detailed Discussion of Astronomy Strategy - Part 1

The OSO Astronomy programme is defined till the end of 2030 by the new VR grant. The next grant (proposal deadline February 2029) will likely cover 6 years from January 2031 – December 2036. Suggest to develop new strategy for astronomy through 2036 with an outlook to 2040 (end of second SKA funding period). Reminder of current VR modules which are likely to also be valid over at least the timescale to 2036.

Module 1 – Management and Central Operations **(50/50)**

Module 2. OSO Telescopes (20 m, 25 m, LOFAR, residual APEX, possible new dish) - includes Triband receiver for 20m funded by Hasselblad **(50/50)**

Module 3. ALMA Receivers **(100/0)**

Module 4. ARC Node. **(50/50)**

Module 5. SRC Node **(100/0)**

Discuss Module 2 later. **Bold** figures give fraction of VR/Chalmers supplied co-funding

Module 3 – ALMA/mm Receivers

Construction work on delivering ALMA Band 7 unlikely to start till beginning of 2028. It is unclear but it could take 4 to 5 years to construct(?) and hence construction could also cover first two years of next grant period i.e. 2031 and 2032. OSO can request VR money in next period for these years and get GTO or ESO will have to pay these last years. What happens though beyond 2033 when Band 7 construction is finished?

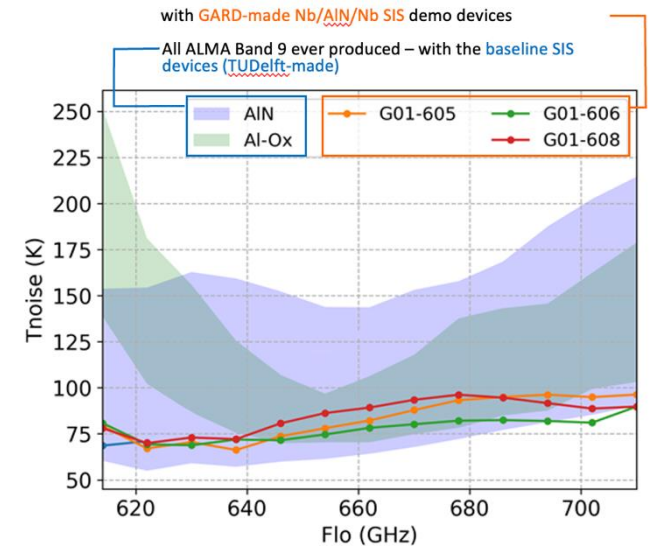
Possibility exists to deliver next European sourced WSU receiver band i.e. Band 9. A Netherlands NOVA design has already been made in conjunction with GARD in the Chalmers Clean which already satisfies WSU requirements (see right) - but is not yet published.

Possibilities exist for both collaboration and competition with NOVA+ other Partners for future Band 9. OSO has an advantage in owning the current Band 9 cartridge in the SEPIA instrument on APEX. Consider working toward our own upgraded Band 9 prototype for demonstration on APEX. MPIfR plans to continue with APEX well beyond 2028 and we can propose a new WSU Band 9 to MPIfR as part of a continuing contribution to ALMA receivers.

Since Band 9 was mentioned in our VR proposal some Module 3 funding could be used for Band 9 development.



Prototype ALMA band 9 with GARD devices (Collaboration with Nova)



Module 3 – ALMA/mm Receivers (cont)

Can also work with industry in Sweden to develop capability to be independent of other partners (get VINNOVA funding?) to allow for mass cartridge assembly and testing, so that we can credibly deliver a new all-Swedish Band 9 for ALMA. Starting such studies can also be a way to show we are working toward future industrial return which otherwise it will look like a weak area in our 2029 after the huge success for SKA (and to some extent ALMA) industrial return in the past.

Other possibilities are suggest to MPIfR for APEX a small array of Band 6+7 receivers as prototype for such a heterodyne array o AtLAST, the proposed 50 m diameter telescope at the ALMA site; but someone else would have to pay for such a prototype instrument since we can't.

Continue with pushing case for LETO submm satellite with GARD receivers.

Push also for use of Band 6+7 on future space VLBI mission and delivery (in return for being paid) of Band 7, Band 6 and Band 6+7 to new mm telescopes being build around the world for EHT observations of black holes.

Possibility that by second half of 2030 when an SKA Development programme might seriously kick-off, paying half of development costs, that GARD could design prototype SKA Band 6 receivers (covering 15 – 22 GHz or 15- 43 GHz).

Module 4 – ARC node – The implementation of WSU for observers use is running about 3 years late, so delivery in 2033 not 2030 (with some receiver bands such as Band 9 happening after that). After next coming hire the ARC node will have 4 x 0.7 FTE which is comparable in size to other nodes around Europe. Beyond that no new hire for the ARC node through rest of the 2030's is envisioned. This complement of ARC node personnel can support standard operations while guiding users toward the transition to WSU observing 2031-2033.

In next 5- 10 years a strategic goal would be try to maximize synergy with SRC Node to make use of its large-scale computing competence and resources for ALMA; the future unique value-added of the ARC node for supporting Swedish ALMA users likely in this area. Coming new hire of new permanent computer literate person for ARC node is a vital recruitment to form a bridge to the SRC node.

Module 5 – SRC node

At the moment there is confusion on where the SKA SRCNet is going both short-term and long-term, which makes long term planning right now in practice impossible.

SKAO is saying it is taking ‘short term’ emergency measures to ensure the delivery of services for SKA-low AA2 Science Verification by the end of 2027, but it feels more like a coup in which SKAO is replacing SRCNet staff/responsibilities in key areas to be replaced by SKAO control (i.e. managing F2F support and identity authentication services)

Recent SKA committee of council papers talk about future large Tier 1 nodes under the control of SKAO and smaller Tier 2 nodes (doing something but it is not clear what.... perhaps doing specialist tasks or just serving their national users in PI-led projects?). The Swedish node at 1.5% of total compute/storage would undoubtedly be a Tier 2 node. Not clear that Tier 1 nodes will happily allow themselves to be managed in detail at the level that SKAO seems to want – so there could be a standoff, but SKAO in the end controls to whom it sends data and the SKA countries sitting on the council are invested that SKA works as seen by users, and are willing to support SKAO in achieving that, so in the end SKAO may win any standoff.

Guess we have to wait for the dust to settle.... We have an ongoing recruitment to our SRC node just about to start (following the plan in the VR contract). My instinct is that such a person will be useful for the SRC/ARC nodes whatever happens, so we should go ahead with the recruitment (?).

If Tier 2 SRC nodes will mostly serve local users this will be closer to how our ARC node works and so will increase chances of synergy at OSO between our ARC and SRC nodes. On the other hand SKAO will demand that all countries pay their share of core data storage costs and the work of Tier 2 nodes may not be counted (at least fully) as such core activity, so in the worst case Sweden may have to pay a large bill to SKAO for core SRCNet services while also paying the people we have hired for our SRC mode and maintain our hardware levels. Also VR might well consider these residual Tier 2 activities as normal national infrastructure activity for which the host university should pay 50% rather than the ‘international project’ it is now as for which VR pays 100% of the cost. Such an outcome would be bad for OSO given that funding from Chalmers that can be used for co-funding is extremely limited.