

Minutes of the AMSTAR 2007 mid-year meeting, DELFT, June 22nd.
(minutes by MG).

Agenda:

1. <u>Welcome</u> T. M. Klapwijk
2. <u>Report on the RadioNet Board Meeting in Grenoble</u> M. Guélin
3. <u>Progress report on the Work packages: Results, Prospects,</u>
WP 2.1.1 D. Maier (IRAM)
WP 2.1.2 V. Belitsky (Chalmers)
WP 2.1.3 A. Baryshev (NOVA)
WP 2.2.1 A. Baryshev (SRON/NOVA)
WP 2.2.2 N. Honingh (KOSMA)
WP 2.3.2 T.M. Klapwijk (TuDelft)
WP 2.3.3 V. Belitsky (Chalmers)
2.4.1 B. Lazareff for A.L. Fontana (IRAM) and B. Ellison (RAL)
2.4.2 T.J.R. Gao (TuDelft)
4. <u>Discussion and Preparation of FP7 proposal</u> _chair_M. Guélin

Participants: J.R. Gao, D. Lukov, C. Lodewijk, T.M. Klapwijk (TUD); A. Baryshev (SRON/NOVA); W. Wild (SRON); N. Honingh (KOSMA), D. Maier, B. Lazareff, M. Guélin (IRAM); G.H. Tan (ESO); V. Belitsky (GARD/OSO); J.M. Kreig (ObsParis); F. Schaefer (MPIfR); M. Seelmann-Eggebart (IAF).

The morning session was essentially devoted to the progress reports on the different work packages (WPs) . Note that WP 2.1.4 and 2.3.4 were already terminated in Dec 2007. The afternoon was mostly devoted to discussions and presentations on the JRA FP7 proposal AMSTAR+.

The slides of the progress report presentations can be found on the RadioNet/ AMSTAR WIKI site. We stress below only a few noteworthy points:

Acknowledgements: During its last meeting held in April in Grenoble, the RadioNet Board stressed the importance of acknowledging RadioNet for its support in all publications related to the WPs.

Final Reports: the work and results of **all** AMSTAR WPs should be summarized in a final report that is due imperatively by the end of 2007. The format of these final reports should be close to that of a short article: 6 to 12 pages. The reports should include figures with explicit captions, one of which showing hardware, i.e. the last version of the prototype mixer or amplifier that was realized. The total manpower effort (in person months), the total budget and the WP duration should be mentioned. List personnel (students, post docs, technicians,...) that was hired thanks to the EU contribution (particularly for AC institutes) and the publications made or in preparation. A more explicit template will be given this Fall.

Copies of AMSTAR prototype mixers on telescopes: The first prototype mixers developed in the frame of AMSTAR WP 2.1.1. and 2.1.4 were used as models for the mixers of the low-noise wide-band dual-polarization 3-mm mixers installed on the IRAM Plateau de Bure (PdB) interferometer in the Fall 2006.

The 7 pixel dual-frequency 0.6-mm and 0.35-mm mixers of the CHAMPS+ receiver, essentially derived from WP 2.2.1, were installed in April 2007 on APEX.

The new PdB and APEX receivers are used for regular observations. In addition, the 4-element 2-mm focal plane array receiver developed in the frame of WP 2.4.1 should be tested this year on the IRAM 30-m telescope.

New technology development on AlN tunnel barrier devices: A new technology development, made at TUD and SRON by Chris Lodewijk, Tony Zijlstra and co-workers, was presented by Teun Klapwijk. This development concerns ALMA band 9. Critical current densities $>70 \text{ kA/cm}^2$, much higher than with AlO, were reached with Nb/AlN/Nb devices. One such device was inserted in an ALMA cartridge and shown to work with a slightly higher noise than the AlO devices, but with a larger tuning band.

FP7 JRA proposal:

Seelmann-Eggebart (IAF) presented the 100nm Metamorphic HEMT Technology developed at IAF Freiburg. 4-inch GaAs wafer produced with a very good yield (90%). Price of devices should also be good. Following the design by Chalmers University of a 4-8 GHz LNA, IAF produced a 4-8 GHz HEMT amplifier operating at 10 K with a noise temp of 3 K. A W-band (75-100 GHz) 2-stage cascade amplifier prototype yielded a 20 dB gain, a noise figure of 3.3-4 dB and a noise temperature of 290 K. Study of a compact fully integrated W-band heterodyne receiver MMIC is in progress. (See slides of this presentation in the AMSTAR WIKI pages).

As shown by **Franck Schaefer**, this work prepares the development of AMSTAR+ WP#1, namely that of a Prototype W-band heterodyne array module using metamorphic HEMT technology.

The advantages of the IAF GaAs solution, wrt the InP solution of JPL, are the large yield and the fact that the technology is Europe-based. JDG pointed out that the tests IGN did some years ago showed that InP transistors were then better than GaAs transistors at high frequencies. The present results are thus good news.

Bernard Lazareff presented the current ideas about a Large FP array of SIS receivers operating around 1 mm wavelength (AMSTAR+ WP#2).

One considers the direct coupling of the SIS mixers and LNAs that will be jointly co-designed. Both photonic mixer and Gunn+ tripler options will be considered for the LO.

Andrey Baryshev presented the 3rd foreseen WP, FPA SIS array at frequencies above 0.5 THz.

Marked differences exist between this WP and the previous, lower frequency WP -- as for example the LO generation and insertion, the realization of hybrid couplers for 2SB or balanced schemes. Similarities exist, on the other hand, e.g. for FPA packaging/optics; this suggest information must be shared between all WPs.

The size of the 3 previous FP arrays was discussed. The aim could be 50-100 pixels. (This implies twice as many mixers and amplifiers, as was pointed out!).

It was agreed that the electronics should be kept out of the AMSTAR+ packages which should concentrate on more unique things.

Netty Honingh presented the last WP: FPA for sub THz frequencies. OSO, SRON/TUD/NOVA, ObsParis, and KOSMA are interested.

The frequency of 2 THz is commonly accepted as a upper limit for the AMSTAR+ studies. Target telescopes could be APEX, Antartica and SOFIA. The general idea would be to build a joint prototype with more than 4 pixels. The question of whether only HEB mixers should be considered was raised. The work at TUD shows it could be possible to go to 2 THz with SIS mixers. There was an agreement for trying very high freq SIS, may be in the frame of WP#3. For arrays, HEBs may be safer. Build prototype with more than 4 pixels. Other open questions are QCL or not? Integrated amplifiers or not?

It was agreed during the meeting that the 4 WP coordinators would contact the AMSTAR institutes that voiced interest and prepare by the end of July. a first evaluation of their WP (WP goals, list and short description of sub-WP, evaluation of manpower, budget, give calendar)



!!!!!!ADDENDUM!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!

!!!!RadioNet Executive Telecon of July 10th !!!!

Precisions on the FP7 calendar were given at the last RadioNet Executive telecon on July 10th.

The EC will issue its call for I3 proposals on Nov 15th 2007, with a deadline for the reception of proposals (i.e. RadioNet FP7) in Brussels **on February 15th, 2008. This is earlier than expected.**

The new time line for RadioNet JRA proposals is then the following:

- 1) *Mid September*: confirmation of the Letters of intent sent last year (indicating at which stage the JRA proposals are) and/or new ideas.
- 2) **Mid October**: deadline for JRA proposals to RadioNet
- 3) *Early November*: peer review of proposals
- 4) *November 14th*: RadioNet Board Meeting in Madrid and decision on JRA proposals.

This calendar is tighter than expected as the proposals should be in their quasi final form by mid-October. It is thus very important that the Coordinators of the 4 WP circulate (with copy to me) a first version of their parts by early August.

Note that there is still a large uncertainty on the EC budget for I3s (could be lower than expected).