Minutes of the September 5 2012 meeting about the status of the NIKA project

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Participants:
Néel: AB, AM, CH, MC
LPSC: JMP, OB, LP, AC, RA
IPAG: FXD, NP
AIG Cardiff: SD, EP
IRAM Grenoble: KS, RZ, SL
IRAM Spain: connections problems

Agenda

The following agenda lists all the ongoing items to be discussed about NIKA. As it was foreseen, only some of these items have been covered at this meeting, others have been only partially covered (*written in italic below*), and other will be discussed in a future meeting (in gray below).

1) Future instrument political status and financing
   - 1.1- Financing (grants, IRAM situation) for the coming years
   - 1.2- Possibilities to pursue the project with reduced and/or delayed budget
   - 1.3- Instrument status: design, cryostat fabrication and scheduling
   - 1.4- Management of the project and MoU

2) Prototype:
   - *2.1- Preparation of upcoming November run*
   - *2.2- Characterization in lab of the HDPE lenses transmission*
   - *2.3- Inclusion of NIKA into the telescope Control System and PaKo*
   - *2.4- LPSC electronics*
   - 2.5- Status of the off-line processing of the last run at the 30m (June 2012)
   - *2.6- Possibility for a 1st run open to the community in 2013*

3) Main problems to address for the prototype and instrument developments
   - 3.1- KIDs calibration (3 tones modulation, resonance locking, load, …)
   - 3.2- Crosstalk
   - 3.3- Identification and mitigation of main noise contributors
   - 3.4- Software

Minutes

Meeting started at 14h30.

Karl's presentation

Political Status of NIKA II project

- Recall of proposed setup in the call for tender and status of board decisions

- SAC report 2012
- Following proposals (ANR, ERC, FOCUS), and their status.
- IRAMs situation (since June 2012)
- Possible remedies
- The name question

Recall of proposed setup in the call for tender (what was the proposed deal ?)

- The project would have an accounting value of max 2MEu.
- The proposing consortium would be rewarded for their contribution with up to 1 MEu equivalent guaranteed observing time at a rate of 1kEu/scheduled observing hour.IRAM would come up with 1 MEu cash for investments and participate or take care of software dev, optics design, commissioning, detector dev and fab.

Board decisions:

- Nov. 11 IRAM SAC supports proposal of NIKA consortium.
- Dec 11 IRAM Council supports proposal of NIKA consortium with some remarks on organization.

SAC report 2012

- After NOEMA, NIKA II was given 2nd highest priority.
- Specification prios are : 1) Sensitivity – 2) FOV – 3)Polar - 4) 0.8mm
- SAC requests a more detailed "roadmap" how to achieve the sensitivity goal.
- Management structure should be improved in
  - work break down
  - definition of partner interfaces and interaction

Following proposals (ANR, ERC, FOCUS), and their status.

- ANR blanche - Neel- LPSC- IAS-IPAG 900 kEu –*25%* mpower

successful

- ERC Syn. -IRAM-Neel-LPSC-IAS 5.4 MEu -mainly mpower

unsuccessful

- FOCUS -IPAG-Neel-IRAM-LPSC-a.o. 3 Postdoc + techno

successful

Another EU ERC project has generated 500 kEU for CEA to support Polarimetry (breakdown unclear).

IRAMs Situation (since June 2012)

- All IRAM partners (CNRS, MPG, IGN) do have great financial difficulties
- The IRAM budget cannot be adapted to the inflation in 2013
- IGN asks for a (so far temporary) stop of payments (only 270 kEu out of 700 kEu) for 2012, 2013 unclear.
- Supplementary costs have been identified for the IRAM PdB TPH project.

On these grounds, the IRAM administration council has asked for a stop of all investments for instrument building others than for NOEMA. The council also asked to come up with a personal plan which foresees cost reduction.
=> This means for the time being IRAM is unable to generate investment as foreseen for the NIKA project

Possible Remedies

- Downsize non-critical items to redirect money to cryo.
- Swap money between IRAM and consortium to allow IRAM "payback" later
- Delay project until IRAM gets cleared investment path (12-24 months)

- IRAM (+ ev consortium) seek new funds for invest
- Seek for additional partners in consortium and increase rewarded time

The name question

During the different proposal preparations and lobbying period the naming of NIKA for prototype and facility instrument was often cause of misunderstandings.
During the ERC syn reviewing the fact that this name was the same probably has contributed to the remark that the new project will anyway be done as it is already ongoing.
I re-suggest to re-think about a specific name for the new facility instrument.

Discussion

1) Political status and financing; Possibilities with reduced/delayed budget; Instrument status

- Karl: **Electronics, optics can be upgraded later** on, but once the cryo is there, it's there. So downsizing should not affect the cryo
- Alain: Polarimetry should be charged to CEA and Grenoble should focus on the cryo.
- Karl: The consortium should not bring more that 1Meuros otherwise the payback in hours of observation should be rediscussed
- Alain: We should have enough money now to build the cryo with a small electronics (To be discussed with Saclay). Meeting with Saclay foreseen for the beginning of October)
- **Alessandro: the key for now is to talk to Saclay and see how much we can take from them**
- Cardiff: If we can prove that the project will be ongoing, they'll be able to put a proposal to get money to participate, new call before the end of 2012.
- Alain: We'll build enough electronics for 4 boxes (=1000 pixels). The cryostat is being designed, we don't know how much it'll cost yet. The number should be here by Feb 2013. **We have enough money to work up to early 2013**.
- Karl: sensitivity remains the big priority, "no big thing which is not sensitive".
- Alain: **We design and build the cryostat for the best instrument**, if we have no money, we don't build the electronics. We have two more years to worry about electronics, but we need to start now for the cryo and optics. So no concession on the design. Perhaps electronics will make progress by that time too...
- Karl: Maybe the electronics is constrained by the multiple detectors. If we can solve it at the detector level, we might relax constrains on electronics and be cheaper... (e.g. crosstalk)
- Olivier: Maybe lower the frequency of the detectors to relax on the bandwidth
- Alain: we need electronics to read 4 boxes for now (1000 pixels) + 2 at the telescope + 1 or 2 spares (full instrument = 20 boxes).
- Juan: 20 kEuros/box without the synthesizer (~ 250 pixel + 150 blinds per box), 12 boxes = instrument without polar.
- Alessandro: we can always build 2 less boxes and take those at the telescope back and forth. **We must be able to test a big array this November**.

- **NIKA 2010 will be used as a test bench for the 1000 pixels arrays**. The optical design to build lenses allowing to adapt the previous illumination of 36mm diameter arrays to 80mm diameters arrays is done; no other change to the cryostat is needed.
- Karl: **Once the cryostat design is done, write a report in order to check the compatibility with the 30m at all level** (size, spacing for everything [cryostat, electronics, pumping, cryocoolers, etc.], electric consumption, etc.).
- Currently 100W/box => 20 box ~ 2kW for electronics only, then there's the compressors, etc.
- SL will send drawings so that people can work with good estimation of the spacing available.

Karl: Topics to be discussed next:

  - Work breakdown of the project: working groups, regular meetings
  - What do we want to do during the next test run? We are measured against GISMO *and* against the progress we make from one run to the next. Plateau problem? Final numbers for the current sensitivities?
  - We are under pressure because of the relative success of GISMO and it won't take long before we're asked when we are ready for real science.

Remark: "next run" was discussed first then "organization", then "next run" again; for coherence I report organization first, then only after, all the discussions about next run (which were anyway scheduled in part 2 of the agenda).

- **Organization of the project**: we need to define a few things for the administration (requested by IRAM council)
  - **Need an identified accountant**
  - Scheme of schedule progress, milestones
  - Reporting several time / year for funding etc. => **Project Manager**
  - Right now PM is Alessandro. But they want a person who is not necessary a scientist, just someone who is doing the minimum paperwork...
  - 1 person per sub-group should report to PM, who will then synthesize figures
  - Similar things for Schedule; e.g. **milestones** achieved / to do: every ~6 months
  - The schedule will be checked by Samuel at IRAM... he could check both schedules at the same time
  - **Sub-groups:** small team dedicated to 1 topic (e.g. cryostat / optics / pixel design / crosstalk / electronics etc.). Currently it looks like everybody is on all the groups and that some people should focus on more specific things (not quite true in reality, but the impression is there) => Néel will come with a list to clarify this before the October kick-off meeting; update list done for ANR proposal
  - Set up regular **meetings/discussions** between members of subgroups. OK for some groups already (e.g. electronics) but not for others (e.g. **software**: NCS / PaKo / Processing …/ but also interaction with calibration)

2) Prototype: next run, lab work, processing previous run, opening to the community

What to do for **next run**?

- => Tests on **plateau / sensitivity**.
- Alain: The **plateau** is virtually solved; we have to work on the data. Extremely confident that this is a hardware problem: the resonances are measured against a moving base line that is biased by **non-linearities of the mixers**; the idea is to correct this bias using blind tones before the data production (pre-processing before RfdIdQ).
- Robert: the plateau prevents us from giving any other number than FWHMs... no focus, no sensitivity...
- Karl: We can't afford to have another run with a Plateau and not being able to derive good numbers...
- Juan: LPSC has **simulations** under way, to be tested on run 3 data. Will be tested also on lab data with a modified chopper for the sky simulator. We have 1 month to do that, but with different arrays and electronics than runs 3 & 4 since they are at the telescope.
- Samuel: we need to **re-test the plateau**, defocusing, detector biasing, under good weather, not at sunset when temperature variations distort the antenna... (*I meant re-test not only plateau, but also all other "commissioning" actions allowing to know the instrument, identify problems, make science*)
- Other goal of the next run: **train the IRAM personnel** with cooling down and run the instrument.
- If we do not build a *really* better array, we'll leave the current arrays. Anyway, we'll change the electronics + computers (**3 computers in a box to be shipped to Granada** soon).
- We may need the wobbler for focus only, but we hope not.
- Robert: If the **wobbler** is of any use it would be for **focus**, nothing else. But even so, it is very possible that it would bring more problems and data quality degradation than **not using it**; the only way to know is through statistics, accumulating focus data using the NIKA style (i.e. without wobbler).
- Samuel: concerning operations at the telescope: **NIKA** is now included **in PaKo**. But is it ready to accept **feedback from NIKA ?** (e.i. send a command through PaKo, NIKA performs some internal calibration, then send back to PaKo a ready message, and then the telescope movements start) => to be **checked and discussed with Hans**.
- Samuel /Alain/Robert: It would be very useful to increase the **NCS Slow Loop from 1 Hz to 8 Hz**. And if we do that, will the Elvin broadcast increases its rate also to 8 Hz? => to be discussed with **Hans & Albrecht**.
- To do also for next run: characterize noise / sensitivity => on sky and stable independent reference like eccosorb ? Eccosorb cooled with nitrogen is not stable enough, only warm eccosorb is stable enough, but it's too warm for the KIDs => it looks like only accumulating well calibrated data on faint sources would give the answer.
- A plot from a lab test shows a **great linearity between power and resonance frequency**. The problem is to determine precisely the position of the frequency; which is not easy when the resonance profile has a complex shape

(2 tones modulation is possibly not sufficient). The lab tests with a moving tone probing the resonance are very long because the sky simulator needs to thermalizes itself at each temperature step.

- A quicker and more useful way is to do **Sky Dips**, with stops at regular airmasses intervals, using for example a "**calibrate**" command in **PaKo** which let the time at each step to re-center the tone at the resonance frequency => we need to implement this function in PaKo.
- For next run we need to have the instrument well calibrated and characterized so that we can do good quality "**science test sources** observations"; this is still a technical run, so no need to go through the TAC for these "science test sources". But we hope we reach a level such that this question will be valid for the next run in 2013.
- Beside our hope for the possibility of a **science oriented run in 2013**, the NIKA team will also ask for a **technical run to test polarization**.
- Open question about the simulation of polarization in optical design. Not sure Zemax has the best tools to do that (Samuel will look); The **LPSC** through the Planck group has access to a **GRASP** license => see if it would be possible to do polarized NIKA simulations with this group.
- Map polarization: M1 to M6 mirrors are flat, they should create much intrinsic polarization, but this is another story with curved mirrors… **Karl will send a summary discussion from the SAC about polarization effects**.
- Samuel: worried that the **warm HDPE lens may create a lot of background** degrading the sensitivity. Not easy to dismount the lenses currently on NIKA to bring them back to Grenoble and do transmission tests; it would be better if we come with another lens to replace the current one at the beginning of the run. => Do some tests in Grenoble with samples, we'll see afterwards what to do with the current lens (e.g. investigate the possibility to add an extra nose with a thin window to cool the 1st lens). Samuel will send to Cardiff the characteristics of the entrance lens.
- For the future instrument we will maybe need to create a sub-group to investigate the lenses problem, e.g. HDPE, Silicon, Quartz…

17h30: end of the meeting, followed by informal discussions for ~1h.

Post meeting remarks about future meetings:

- On Monday September 24th 9:30 at Institut Néel there will be the NIKA Kick-Off meeting with members of the NIKA consortium (Néel, LPSC, IPAG, CEA, AIG Cardiff, SRON, Roma). Alessandro's description for the meeting "We will try to keep the discussion mostly on very important general technical points, collaboration organisation and responsabilities within the Consortium. In particular, it is important to try organising efficient working groups to better approach a project that is getting bigger (i.e. 3 arrays, 5kpixels). Working groups are a small part of the consortium dedicated to specific tasks. They can have autonomous teleconfs and meetings
The WGs have to produce a progress schedule (with milestones) of their activities and have to report regularly to the PI."
- Probably early October (date to be chosen) we will have a meeting about the data processing of previous runs: conclusion and lessons for the upcoming November run, and preparation of the run itself.