GLOW Basic Interferometry 2008 Overview

Date and Time

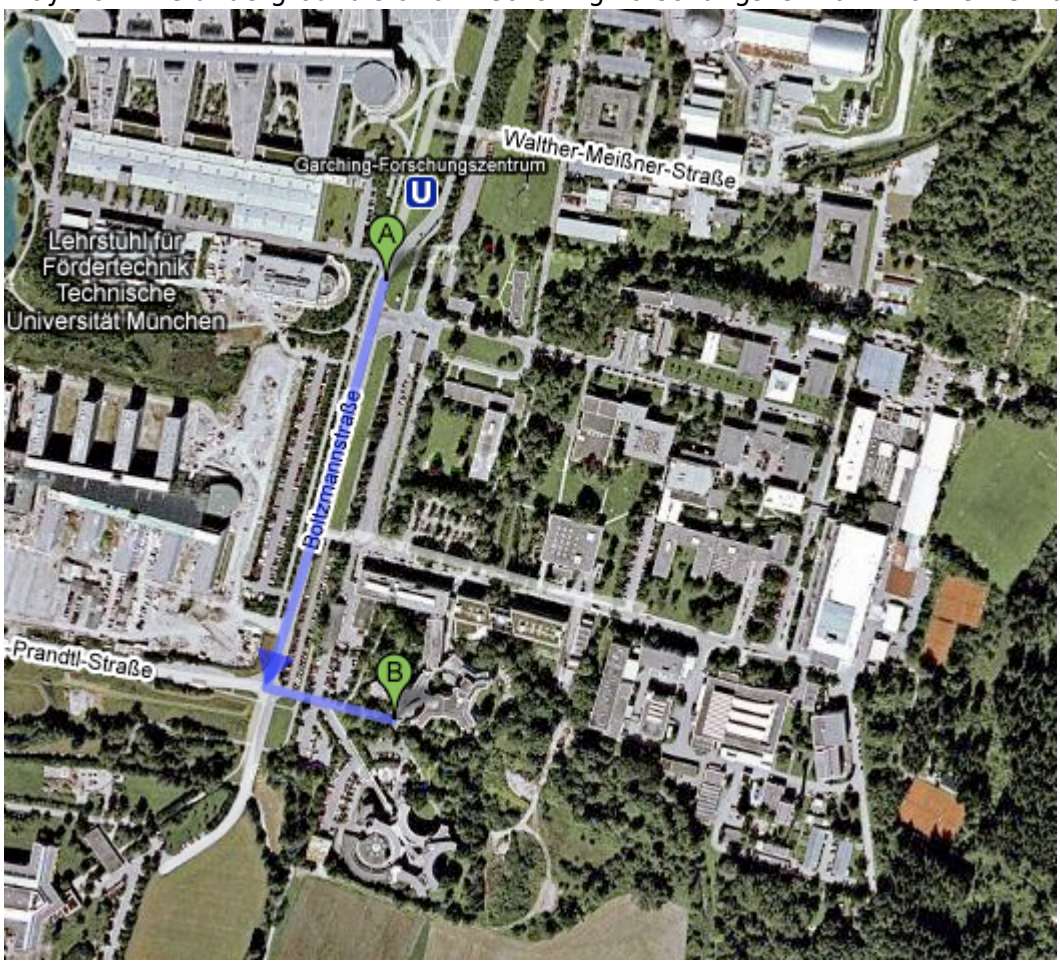
2008 November 17–19

We will start modestly early in the morning on November 17, probably at 9:00 or 10:00, depending on arrival times. So you will probably need to travel to Garching on the weekend.

Location

MPA Garching, Karl-Schwarzschild-Str. 1, 85748 Garching
Seminar room 006 (basement)

Way from the underground station “Garching Forschungszentrum” to the institute's main entrance.



Link to Google Maps

Hotels

Once you know your arrival and departure date, you can contact Maria Depner (maria@mpa-garching.mpg.de, Tel.: +49 89 30000-2214) and she'll book rooms in one of the following hotels.

The first two are located in Garching. Reaching the Institute is possible by foot (ca. 20mins), or by using the underground (1 Stop). The third hotel is in a business park, outside Garching, but beside the next U6 underground stop; the Forschungsgelände Garching is only two stops away.

Hotel Hoyacker Hof, Freisinger Landstraße 9a, 85748 Garching rooms from EUR77 per night

Hotel König Ludwig II., Bürgerplatz 3, 85748 Garching rooms from EUR89 per night

Etap Hotel, Daimlerstrasse 3, 85748 Garching (Garching-Hochbrück) rooms from EUR49 per night

Participants

Name	Type	Arrival Date	Departure Date	Hotel	Looking for roommate
James M Anderson	(T)	Nov 16	Nov 19	?	N
Sven Duscha	(S)	Nov 16	Nov 19	N	N
Frank Breitling	(S)	Nov 16	Nov 19	?	N
Jochen Eislöffel	(S)	?	?	?	?
Joerg Knoche	(S)	n/a	n/a	N	N
Thomas Riller	(S)	?	?	?	?
Christian Vocks	(S)	Nov 16	Nov 19	?	N
Matthias Hoeft	(S)	?	?	?	?
Petr Kuchar	(S)	?	?	?	?
Hristo Stoev	(S)	Nov 16	Nov 19	?	?
Enno Middelberg	(T)	Nov 16	Nov 19	?	?
Emanuela Orru	(B)	Nov 19	Nov 19	N	N
Artie Hatzes	(S)	Nov 16	Nov 19	N	N

Lectures

Lectures will be derived from the NRAO Synthesis Imaging in Radio Astronomy series. See http://www.aoc.nrao.edu/events/synthesis/2008/lectures08.html

In the table below, you can find the titles of lectures from the 2008 summer school. If you think you would like to teach a section, please fill in your initials. If more than one person wants to teach something, we can negotiate later, so don't be afraid to put yourself down for something which already has a name. The initial priority level was assigned by JMA, but feel free to put an X in the request column if you think it is important for you.

Title	Lecturer	Priority	Requests	Day
Fundamentals of Radio Interferometry	JMA	High		Mo
Antennas & Receivers in Radio Astronomy	EM	High		Mo
Cross Correlators & New Correlators	JMA	High, but skip many parts		Mo
Polarization in Interferometry	SD	High		We
Calibration and Editing	JMA	High		Mo

Title	Lecturer	Priority	Requests	Day
Imaging and Deconvolution	EM	High		Mo
Sensitivity & Noise		Low		
Advanced Calibration Techniques	ALMA?	Medium		Tu
Spectral Line Observing		Low		
Error Recognition & Image Analysis		Low		
Galactic radio science		Very Low		
EVLA		Very Low		
Very Long Baseline Interferometry	EM	High		Tu
Astrometry		Low		
VLBA Upgrade		Very Low		
Wide Field Imaging I: Non-coplanar arrays	JMA	High		Tu
Wide Field Imaging II: Mosaicing	SB	Medium		Tu
New Instruments		Low		
Millimeter Interferometry & ALMA		Very Low		
Low Frequency Interferometry	EO	High		We
High Dynamic Range Imaging	EM	Medium		Tu
Proposal Writing		Very Low		
Interferometry of Solar System Objects		Low		
Non-Imaging Data Analysis	ALMA?	Medium		We
Array Design & Simulations		Low		
Extragalactic Science		Very Low		

Schedule

Day	Time	Activity
Monday		
	9:00	Welcome and Introduction
	9:15	Fundamentals of Radio Interferometry
	10:15	Coffee Break
	10:30	Antennas & Receivers in Radio Astronomy
	11:30	Cross Correlators & New Correlators
	12:00	Morning Review Session
	12:30	Lunch
	13:00	Calibration and Editing
	14:00	Imaging and Deconvolution
	15:00	Coffee Break
	15:15	Tutorial Session 1
	18:00	End of Day 1
	19:00	Meet up for Dinner
Tuesday		
	9:00	Very Long Baseline Interferometry
	10:00	Coffee Break
	10:15	Advanced Calibration Techniques
	11:15	High Dynamic Range Imaging

Day	Time	Activity
	12:15	Morning Review Session
	12:30	Lunch
	13:30	Tutorial Session 2
	15:45	Coffee Break
	16:00	Wide Field Imaging I: Non-coplanar arrays
	17:00	Non-Imaging Data Analysis
	18:00	End of Day 2
	19:00	Meet up for Dinner
Wednesday		
	9:00	Polarization in Interferometry
	10:00	Coffee Break
	10:15	High Dynamic Range Imaging
	11:15	Wide Field Imaging II: Mosaicing
	12:15	Morning Review Session
	12:30	Lunch
	13:30	Low Frequency Interferometry
	14:30	Tutorial Session 3
	???	End of Day 3 as people make their way back home

E-mail Announcement Log

2008 Oct 06

Hello everyone,

I have a few things I would like to update everyone on.

First, I will be sending out an announcement on a GLOW basic radio- interferometry school soon through Matthias.

Second, I have some good news to report. In the e-mail from Michael Wise below, you will see that the Dutch LOFAR group has come around to giving a higher priority to teaching the rest of us how to use the LOFAR software so that we can aid in the development and commissioning. Hooray! The proposed timeframe for such a school is January. Looking at the list of suggested topics, I believe that this school will be a fairly high level school. Thus, I think that the idea of having a ~few day school in Garching to cover the really fundamental basics of radio interferometry for our new people is still a good idea.

Third, through a series of e-mail exchanges and a long telephone conversation last week, I believe that there has been a significant shift in the software mindset in LOFAR. It seems that the MeqTrees package, which for so long has been officially downcast by the LOFAR management has now been blessed with some sort of official recognition. This is in part, I believe, a result of some work within Dwingeloo to have a software program to automatically convert MeqTrees software into something which can be run through BBS. This means that the LOFAR management is now officially recognizing that software development and commissioning using MeqTrees can be useful for LOFAR. For us, this

means that we can officially start using MeqTrees to do LOFAR-related work, as MeqTrees is available now, and we do not have to wait some unknown period of time for BBS to appear in a usable state. I will try to keep everyone informed as this gets sorted out.

More later.

James M Anderson

2008 Oct 06, number 2

Hello everyone,

As announced earlier, we are planning a school to teach basic radio interferometry, with an emphasis on practical knowledge necessary for working with LOFAR, in Garching at some point around one month from now. In the previous polling, 12 potential students responded with interest, and we are now moving forward with planning the actual school. Details and a sign-up area are provided below. Note that we need to have people capable of teaching sign up in addition to the students. Please cast your date votes by the morning of Monday, October 13.

Since the initial announcement of our basic interferometry school, Dwingeloo has announced that they are in the planning stages to hold a LOFAR-specific school sometime in perhaps January.

> Date: Mon, 6 Oct 2008 14:04:05 +0200
> From: Michael Wise wise@astron.nl
> Subject: LOFAR data processing school
>
> Dear All,
>
> At the last meeting of the LAD board, James raised the idea on behalf
> of the GLOW community of holding a LOFAR data processing school
> to help train the growing pool of new students, postdocs, and staff that
> will be aiding in the commissioning activities early next year. This topic
> was also raised again at the Hamburg meeting. I think there is no question
> that such a workshop will be needed, so I'd like to begin the logistical
> planning now so we can organize it as soon as possible.
>
> Assuming everyone agrees about the need for such a workshop,
> as a first step, I'd like to ask each of you to take a moment and answer
> the following few questions:
>
> a) How many people from your group(s) would be likely to attend?
> b) What are their skill levels likely to be? (student, postdoc, experienced
> radio astronomer?)
> c) What topics would you like to see addressed? (system overview,
> data preparation, calibration, imaging, time series data,
> single station modes, etc.?)

Given the enormous range of things to cover for LOFAR processing, I doubt that the school being proposed for around January will be able to cover both the basics of radio interferometry, as well as details about what is going on inside the available LOFAR software and how to use the current LOFAR

software.

Therefore, I feel that a school to introduce GLOW members to basic radio interferometry is still a good idea, prior to the subsequent school to be held in January which will go into far more detail. However, I realize that some of you who are already modestly familiar with radio interferometry may wish to skip the GLOW school and only attend the January school.

Therefore, I have created a doodle page for people to sign up for the GLOW school.

http://www.doodle.ch/us7vrswy62ssaqw6

The possible dates for the school are given on the doodle page (October 27 to November 21). We will aim for a 3 (or 2) day school with the greatest attendance possible. Please note that we also need a few people who can give lectures (the NRAO summer school lectures are available on-line) and run a tutorial session. So if you can come to Garching for a day or two and help out with teaching interferometry to other people, please sign up as well. I can talk for a while, but my voice will probably give out after the first day if it is only me doing the talking. (Students, please mark yourselves with an S after your name. Teachers, please mark yourself with a T, and people in-between can use B.)

The main plan is to take selected lectures from

http://www.aoc.nrao.edu/events/synthesis/2008/

and present them to the students during morning sessions. Emphasis will be given by the presenters on material which is most relevant for LOFAR, and for cases where LOFAR is different from existing instruments. We will probably have 10–15 people, so this will be a very informal group, and you can ask questions freely. Then in the afternoons we will have data processing tutorials to give the students an idea of what really goes on in practice. For the ease of the teachers, the tutorials will probably use AIPS with relatively simple datasets from existing instruments, to teach the students the basics of what goes on in radio interferometry.

A room will be organized for us in Garching. Accommodation information will be made available when we have selected the final dates for the school.

Suggested reading material to have available at your institution:

http://www.amazon.de/Synthesis-Imaging-Radio-Astronomy-Astronomical/dp/1583810056/ref=sr_1_2?ie=UTF8&s=books-intl-de&qid=1223306412&sr=8-2

This is the book used by the past decade of summer schools in Socorro. It is aimed mostly at the astronomer wanting to reduce VLA data, with a few diversions into other instruments and frequencies. Unfortunately, they are no longer easy to get ahold of. Try asking for volume 180 from http://www.astrosociety.org/pubs/cs/csorder.html

http://www.amazon.de/Interferometry-Synthesis-Radio-Astronomy/dp/0471254924/ref=sr_1_2?ie=UTF8&s=books-intl-de&qid=1223306706&sr=1-2

This is the main radio interferometry book aimed more at the engineering astronomer side of things. I have found it quite useful for low-level thinking about the hardware and software development, but it is not terribly useful if you just want to process your data.

http://www.amazon.de/Fourier-Transform-and-Its-Applications/dp/0071160434/ref=sr_1_3?ie=UTF8&s

=books-intl-de&qid=1223306882&sr=1-3

Fourier transforms play a major role in radio interferometry, in the basic way that the interferometer “sees” the sky. One must become comfortable with the transform in order to understand the instrument.

I look forward to seeing many of you in Garching.

James M Anderson

2008 Oct 13

On Mon, 6 Oct 2008, James M Anderson wrote:

> The possible dates for the school are given on the doodle page
> (October 27 to November 21). We will aim for a 3 (or 2) day school
> with the greatest attendance possible.

And the winner is … November 17–19.

It looks like we will have 8 to 9 students. I will try to make arrangements with Garching in the next few days, and we will give you more details as we figure them out.

> Please note that we also need
> a few people who can give lectures (the NRAO summer school lectures
> are available on-line) and run a tutorial session.

Only 2 people signed up as possible teachers. In order for this to work, we need to have a few more people show up to give the lectures and help through a tutorial session. Sven, can you twist the arms of some of the people in Garching? They would not need to travel far.

Back with more info soon.

James M Anderson

2008 Nov 03 AIPS Installation

Hello everyone,

As part of the school in Garching, we intend to have a few short data tutorial sessions. The purpose of these sessions is to help the students understand the fundamentals of radio interferometry — not to teach the students how to reduce radio interferometry data.

The software LOFAR will use for processing data is not really in a state which novice users can be expected to deal with in a few days' introduction. Therefore, for the convenience of the instructors who have agreed to help with the teaching, the tutorial sessions will use the AIPS software package, since the majority of the instructors are comfortable trying to do tutorial sessions in AIPS. ASTRON will host a school on using LOFAR-specific software early next year.

So, we ask that everyone attending the school in Garching comes prepared with his/her own laptop having a (recent) version of AIPS installed and running. Instructions for doing this are found below.

On behalf of the organizing group, I look forward to seeing everyone in two weeks.

James M Anderson

Installing AIPS on a laptop computer.

You will need either a computer running Linux or a Mac laptop. You will probably need about 1.5 GB of free space, including some space for the tutorial datasets to be reduced in Garching.

I have installed a new version of AIPS as myself (not the root account) on my laptop this evening. It took about 45 minutes, most of which I was doing other things while the software was downloading from the US. I strongly recommend installing the pre-compiled binary version, as it will be far easier to deal with.

So, to install AIPS, go to

http://www.aips.nrao.edu/

You want to install the current version, which is called 31DEC08, and can be found at http://www.aips.nrao.edu/dec08.shtml

You should open another tab/window in your web browser to see the install instructions at http://www.aips.nrao.edu/install.shtml

I will follow the instructions for Linux computers. If you have a Mac, you will have to read the Mac-specific instructions.

Ok, create a directory on your laptop where you want to install AIPS. It would be easiest if this is also the directory where you will be able to put large datasets. Then, cd into that directory. For me, I made a directory in my home area called AIPS.

Now download the Perl installation script from ftp://ftp.aoc.nrao.edu/pub/software/aips/31DEC08/install.pl and put it in the AIPS directory you just made. Make sure it is executable by running

```
chmod u+x install.pl
```

Next, run the installation script. Make sure you use the -n option to specify installing the binary version.

```
perl ./install.pl -n
```

Follow the instructions on-screen and in the installation web area. Some specific notes are:

5a.

```
Since you are using a laptop, you really probably want to force
the installation to use the name LOCALHOST.
```

7.

```
If you will use a data area in the same location as your program
installation, you can just accept the suggested data area at the
bottom of the screen.
```

8.

```
AIPS is really designed to print out lots of things, and really
wants to have a printer installed.  You don't actually have to
have a printer, but you should try to set up something.  Try the
(D)iscover option.  Otherwise, just ask for a (N)ew printer, and
give it a name of lpr, no options, and say A4 paper.
```

9.

```
Just (A)ccept no tape drives, unless you actually have a tape
drive on your laptop.
```

9B.

```
you probably want to accept only 127.0.0.1 for LOCALHOST to
access your computer.
```

10.

```
(This section is skipped for the binary installation.)
```

When you are finally ready, hit *Enter* to continue. It will take many minutes to download everything.

It will then ask about running a “Midnight Job”. This is a shell script, which you can put into a cron job, to automatically download updated software. It is perfectly fine to accept this, as it will only run manually, unless you manually put it into a cron job. When asked for a password, as the instructions on-screen tell you, just hit *Enter*.

You will need to have your system running in either 24 bit or 8 bit color mode. You can run `xdpyinfo` if you are not sure which bit mode you are using. You are on your own to change the color bit depth of your laptop.

Follow the instructions for starting up AIPS to test the installation. Once you have done that, you can try running just aips with no options to see if it can run the tv terminal. AIPS will ask you for a user number. Just pick a favorite number between say 2 and 30000. Since you do not have to share your laptop with other people, you are free to pick any user number you wish. (And many of us use different numbers to keep different projects we are working on separated within AIPS.)

Type `exit` to stop running AIPS.

Those of you who are eager to get started can read the cookbook at
http://www.aips.nrao.edu/cook.html

Tutorial Sessions

Monday, 2008 Nov 17

Monday's Tutorial

Tuesday, 2008 Nov 18

Tuesday's Tutorial

Wednesday, 2008 Nov 19

Wednesday's Tutorial