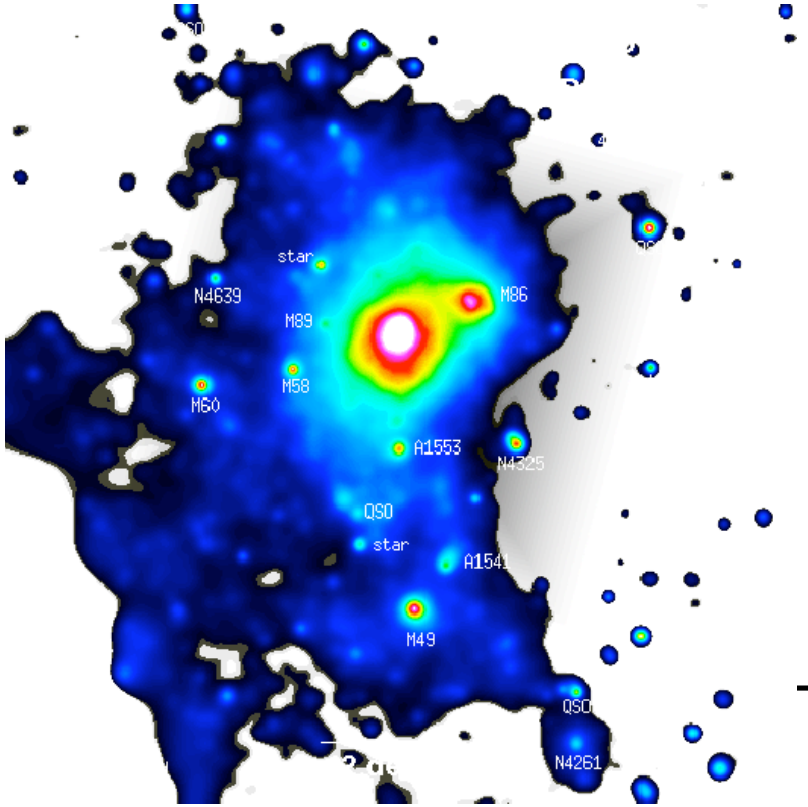
# Advanced Virgo

## Finesse Input File




Andreas Freise

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# Overview

- Where to find the latest Finesse input file for the Advanced Virgo baseline
- Structure of the Finesse file
- Future development

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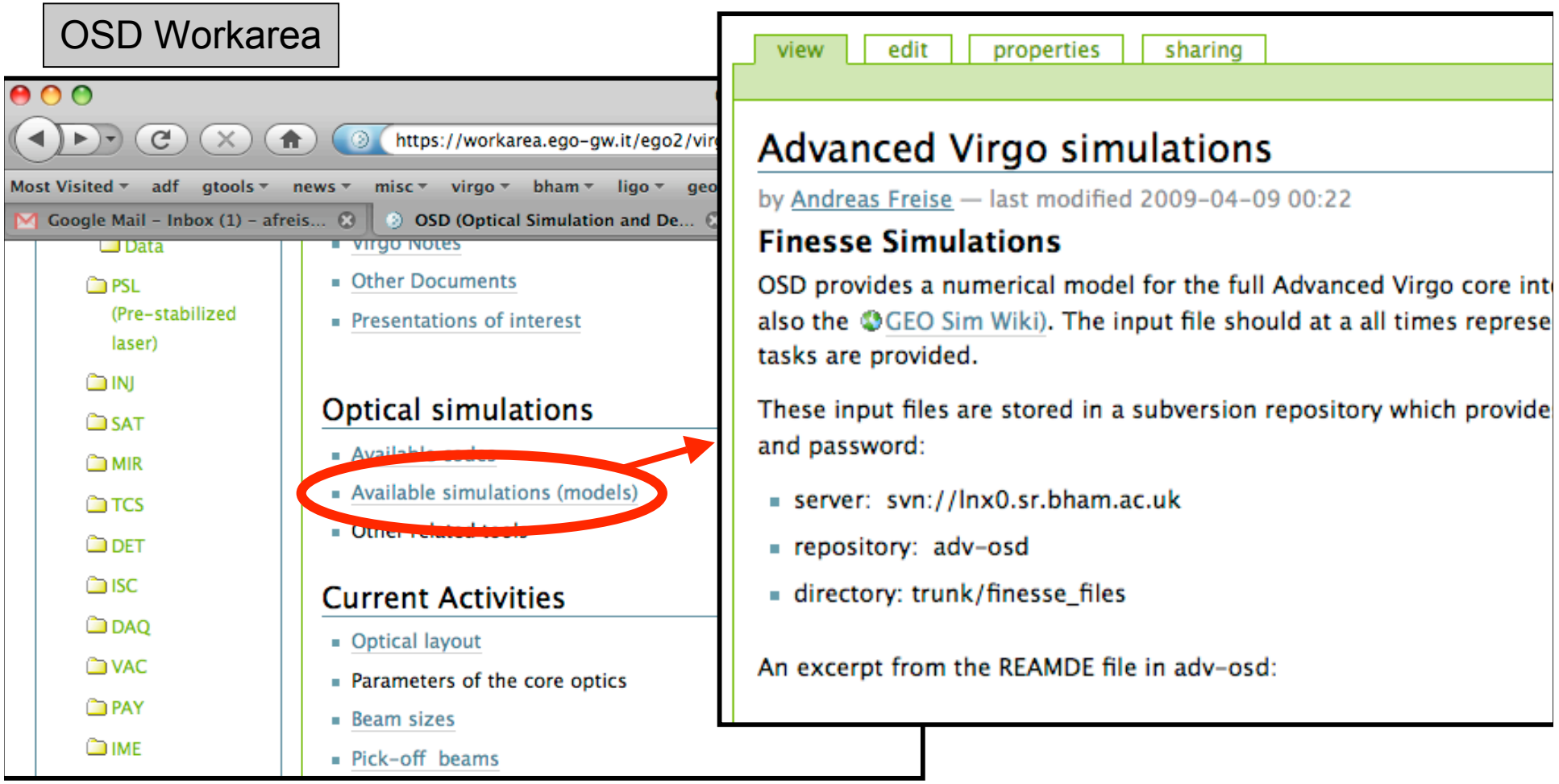
# Where to get the Finesse file?

OSD Workarea

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# The Structure of the Repository

history:

- This directory contains input files with the full Advanced Virgo optical layout. These might have any name but should also be organised by the date of creation in the filename such as advirgo_020209.kat.

basefile:

- This directory should contain only one file which represents at every moment the best known input file which represents the state of the Advanced Virgo design. Currently this file should only be updated by me (Andreas).

optimised:

- This folder is a storage place for input files which were created for specific tasks, i.e. which cannot be used by a beginner for doing a standard simulation task but are required for complex tasks. The files should also feature a date in the filename and should be listed with a short explanation in the README file in that folder

# The Structure of the File

- Example: the X arm
- 'block' structure for possible automation with 'SimTools'
- Comments explaining Finesse specific definitions
- Setup with 'constants' which are declared elsewhere in the file
- Realistic implementation of mirrors (two surfaces,…)

```
%%% FTblock Xarm
%%%%%%%%%%%%%%%%%%%%%%%%%%%% X Arm %%%%%%%%%%%%%%%%%%
% length between the AR of BS and AR of IMX
s lx1 $ly_o nbs3 nIMX1

% IMX
bs2 IMXAR $RIMXAR $LIMXAR $IMXARphi 0 nIMX1 nPOX1
s sIMX $sIM $nsilica nIMXi1 nIMXi2
m1 IMX $TIMX $LIMX $IMXphi nIMXi2 nIMX2
attr IMX Rc $RCIMX

s Lx $Lx nIMX2 nEMX1

% EMX
m1 EMX $TEMX $LEMX $EMXphi nEMX1 nEMXi1
s sEMX  $sEMX $nsilica nEMXi1 nEMXi2
m EMXAR $REMXAR $TEMXAR $EMXARphi nEMXi2 nXP1
attr EMX Rc $RCEMX

%%% FTend
```


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# The Structure of the File

- Input: Dummy laser represents light after the IMC
- Arm cavity geometry: final, as in baseline design
- Interferometer setup: PR + SR, final, as in baseline
- Central interferometer: draft NDRC layout (option 2), angles of telescope mirrors set to zero. Gouy phase approximately 160 deg in PRC and SRC
- Detection: dummy diodes, not optimised
- Modulation frequencies: dummy values (CITF lengths are not yet optimised)

# Future Steps

- Use the Finesse file to model the NDRC options, this includes, for example, the following tasks:
  - How coupling coefficients (due aberrations, astigmatism, etc) relate to power losses inside the recycling cavities
    (This is actually a list of several tasks)
  - How the losses inside the recycling cavities affect the detector sensitivity
  - Setup an alignment sensing scheme
  - Define final Gouy phase for PRC, SRC
  - Optimise NDRC parameters
- Update the file to the baseline design, including the optimisations to the NDRC design
- Cross check R+D results (such as surface maps effects) using Finesse
- Quantify the effects of 'defects' on the interferometer (working towards commissioning)


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# Summary

- A baseline Finesse input file is being provided
- In addition, files `optimised' for specific tasks are stored in a central server
- Finesse modelling work is documented in a `version controlled' environment
- Currently the Finesse file reflects the baseline design, including NDRCs option 2
- **This** file will directly evolve into a commissioning tool
- Your input is important:
  - download the file
  - Use it, change it, fix it
  - Send me the new version
  - Document your work in notes (**not** just in slides!!!)


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...end