Infra-red integral field units, such as KMOS
Trevor Mendel

<u>Smette</u>: *Do you know the origin of the changes of illumination?*

As far as we can tell it seems to be related to small changes in the optical path as the KMOS cryostat rotates—which also appears to drive changes in the line spread function—and small shifts of the spectra on the detector.

<u>Osip</u>: *Do you correct for persistence? In particular your A-B observing strategy should provide a dataset that could help quantify the effect and how it builds up?*

At the moment, no, we don't apply an explicit persistence correction, though we have investigated it. Most of the objects in our survey are much fainter than the sky, and so we expect that most of the persistent signal is subtracted out of our A-B frames after a few exposures, once we hit a "steady state" of freeing and filling traps. In this case we expect that the largest residual persistent flux is in the sky lines, which can vary by 5-10% in absolute flux between exposures, and probably leave residuals of order 0.01-0.05% in the worst cases.

<u>Freudling</u>: *Several of the data reduction issues you discussed were implemented by ESO in the pipeline originally delivered by the consortium. Are you using the current ESO pipeline, or do you use your own version of the pipeline?*

The corrections that I discussed have been implemented as wrappers around the standard ESO pipeline, and admittedly we're currently using a somewhat older version for consistency. In fact many of the corrections included in more recent versions of the pipeline have come from working with the software development group at ESO, passing over some of our wrapper routines etc., to try and improve the pipeline at a base level. I suspect that at some point we'll jump to the more recent version, which will allow us to streamline our overall reduction procedure.

<u>Modigliani</u>:
1. *10 ADU steps in the data: it looks the same problem SINFONI data have. The SINFONI pipeline corrects it on any data. But I do not understand why you say it occurs only on 20% of the data, as instead it should be present in any frame if created by the Instrument Control Software.*
2. *Do you have an algorithm to optimally extract 3D data? ESO would be interested in view of ERIS and improving SINFONI extraction.*

3. *The sky calibration technique you list: O O S O O O O looks like of what MPE found studying Austrian skycorr applied to SINFONI in order to optimize observation time and sky subtraction. I would recommend the audience (in particular ESO) to study this to optimize future use of telescope time and reduction quality.*
4. *You list several data reduction improvements. Please contact ESO (IS, pipeline responsible, SDP) to make sure they end up in the pipeline.*

1. We have tried to implement a similar output channel correction as for SINFONI on the KMOS data, however at the moment this doesn't seem to do a very good job correcting the stepping effect I mentioned. Although we don't fully understand where it's coming from, it appears to be related to voltage drifts during the exposure which are only significant enough to show up 10-20% of the time; we're currently working with IR detector gurus at ESO to understand this better and develop a correction.
2. Not currently, no. Most of the spectra I showed were optimally extracted from the individual slices on the detector using imaging priors, and as far as I know we haven't investigated a fully 3D extraction.
3. It's a good suggestion, and we have indeed worked a bit with skycorr to try and clean up sky residuals in some of our reductions, though it's proved difficult to remove these issues completely due to flexure effects (especially changes in the line spread function).
4. As mentioned before, several of the improvements in the most recent versions of the KMOS pipeline have come from a direct interaction with the ESO pipeline responsible, passing along bits of code etc., in an effort to make these improvements available to the user community.