

HECTOR SCIENCE MEETING
WEDNESDAY 12 JULY 2023, 3.00 – 4.00PM
Zoom – the meeting was recording for minute taking purposes only.

Attendees: Julia Bryant (Chair), Matt Owers, Sree Oh, Marie Partridge, Jiwon Chung, Madusha Gunawardhana, Oguzhan Cakir, Mina Pak, Tom Rutherford, Henry Zovaro, Joon Hyeop Lee, Pablo Corcho Caballero, Kyuseok Oh, Susie Tunitpong, Jong Chul Lee, Hyunjin Jeong,

Apologies: Angel Lopez-Sanchez, Scott Croom, Gabriella Quattropiani, Jesse van de Sande, Sam Vaughan,

Item	
1	<p><u>Action Items from the previous meeting (10 May 2023)</u></p> <ul style="list-style-type: none"> All action items from the previous minutes were addressed prior to the current meeting.
2	<p>Observation and Observer Updates (Julia)</p> <ul style="list-style-type: none"> Issues were identified with the red Spector camera during the first observing run in 2023 and have been intermittent during the following run where images looked out of focus. This was actually due to the data bleeding between rows. Spectral Instruments identified there was an issue and the camera was shipped back to the US for its 4th repair, this time to a faulty resistor. They were made aware of the impact and costs this was having on observing runs. The camera has now been shipped back and a team from Astralis-AAO will be installing it on site on Monday 17 July in advance of the observing run that night, if the camera is cool enough. Sam has been tailoring the tiles slightly to observe with just the blue camera in case of continuing issues. Tom W is coordinating observers for 2023B. Some people who are partially trained in plugging need to finish their training. Julia noted that having positive and keen observers is extremely valuable and reiterated that these are the people who will be able to write key science papers. The observing commitment is currently about 3 weeks per person per year and this will drop to 2 weeks per year once more people are fully trained. Tom W has settled in quickly and will be the run lead for the first week of each observing run. He will also be on site to address any issues that may occur post instrument change. The weather has been clear and is predicted to stay that way during the remainder of 2023 so it is expected that several 100 galaxies will be observed during each run. <p>Action Items:</p> <ul style="list-style-type: none"> Julia will email the group asking those who need to complete their training to sign up for Semester 2023B observing.
3	<p>Data Central Requirements (Julia)</p> <ul style="list-style-type: none"> Data Central applies for funding for requested work and once approved by AAL and NCRIS they put together a work package. The ALL previously developed a web application which allowed for the rapid classification of SAMI galaxies via a thumbnail image. This application will be updated with some selection criteria for Hector. This will be led by Mina, Sam and Matt. Data Central will host a proper database for Hector not only hosting a data base of internal products as well as a data base of internal team data and reduced data. They will also host the full catalogue which would update automatically after each observing run, post quality control. Ideally Data Central will ingest the observing logs and therefore there will be 2 copies of the data one held at Data Central and the other on google sheets (so the data can still be accessed if one platform is off line). Ideally the aim is for the data to be automatically reduced from raw by Data Central. This may take a while as there are a few things to resolve. In the future the aim was for Data Central to run the data products pipeline (emissions, stellar kinematics etc), however it may take 6 months or longer for this to happen, however Data Central can plan for this effort. Henry and others are assisting with this. There currently in not one single master catalogue (SAMI had 2 catalogues – field galaxies and clusters). As the catalogue area is so large and the WAVES redshift are not available. There are catalogues for the following areas for Hector: Clusters H01 and H03 (sub regions of WAVES South provided by UWA), G23 and remaining parts of G12 and G15 regions and some sections in between. Ultimately two thirds of the WAVES North and South regions will be covered and make up the catalogue. The tiling algorithm fits the highest priority galaxies first. Once a galaxy has been observed it is then allocated a priority of 1 (not zero) so that if there isn't another galaxy available to tile in that field, it will be included. The latest version of the cluster catalogue and other regions are available on the Data Central cloud as are the other regions. Tayyaba has completed verification work with TAIPAN and is keen to lead the red shift effort with TAIPAN. An infrastructure funding application has been submitted to MQ to pay for the costs of running TAIPAN for Hector, which is a MQ asset, this would also offer advantages to MQ as the asset will be productive. There are some simulations

being done at the moment on targeting and how many fields and night will be required. If successful it may be possible to move from 2df to TAIPAN to finish the redshift catalogue.

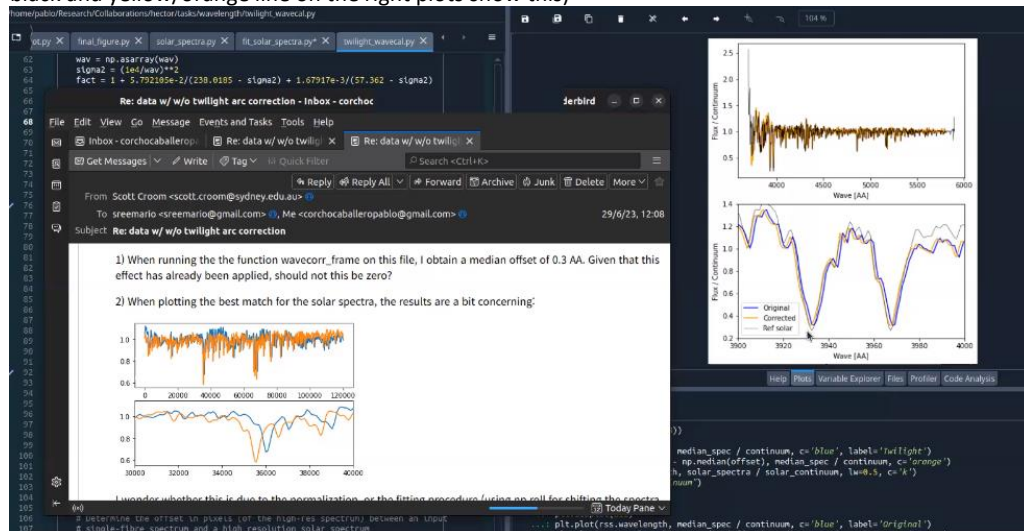
Action Items:

- Sam will send a list to Simon O’Toole so that Data Central can put a proposal together for funding and they can draft a development schedule that aligns with the Hector schedule.

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Testing Wavelength Calibration in the Blue – Pablo

- Pablo has been comparing and assessing the wavelength calibration in the blue arm for AAOmega and Spector using the SAMI method.
- Checked what is the actual performance of this twilight calibration being applied. The cross correlation between the solar spectrum with the flat there is an offset of 0.3 Angstrom, so the correction is not accurate enough. The module is doing a few concerning things as when cross correlating the solar spectra with the twilight that module is selecting a range in wavelength that is very limited, just a 300 Angstrom. There is a very flat region of the solar spectra between 5300 and 5700.
- A new approach has been applied to normalise both spectra (Right hand plot - the blue line represents the observer spectra and the black the solar one) and cross correlate appropriately.
- The left plot shows the offsets – the blue line is the observed and the orange one is the reference spectra – the offset can be clearly seen. Instead of cross correlating Pablo tried to find and match the absorption lines of the spectra (The black and yellow/orange line on the right plots show this)



- It was noted that the fibres to the top and bottom of the chip were the worst.
- The shift of 0.3 Angstroms has not been checked across all fibres. The example shown is from 1 fibre.
- This work is not predefined therefore it would be difficult to put a case to Data Central or ADACS to fund.
- It was noted that there is currently no easy way to save versions and track errors in codes. However items should be saved to git and documented correctly.
- SAMI received some assistance from ADACS.

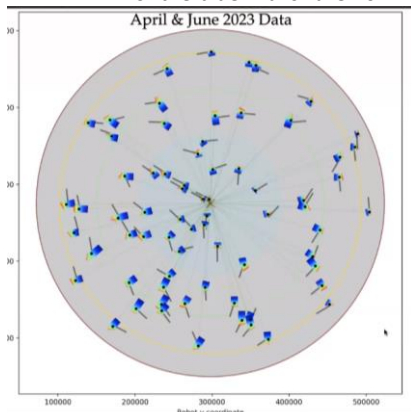
Action Items:

- Sree and Scott will discuss this more with Pablo at the DR meeting before Pablo leaves in August. Pablo to send an outline to Sree.

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CVD Fitting – Madusha

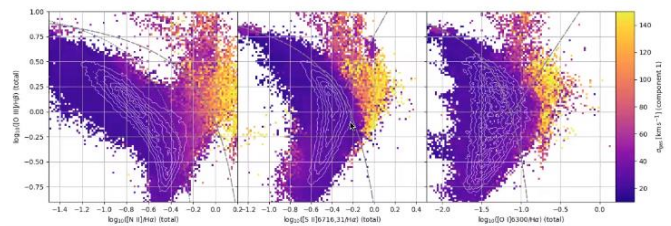
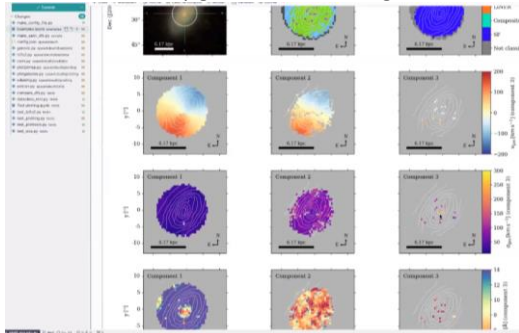
- Madusha will provide an update at the next meeting once she has utilised the data from the June run for 3 star fields to fill in the gaps so the plate is more populated.
- Some hexabundles are missing. There are issues reducing ccd4 data (from the Spector red camera), but the blue data can be used. She will start fitting starting with the 2df optical model and the functional form that has been used for that to assess if it can be expanded for Hector.
- All of the blue “Tails” are now in the correct direction.



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Emission Lines Product Code – Henry

- The emission lines product codes will be ready to publish soon and will be useful to Hector and other projects. It consists of a Python package called Spaxelsleuth originally for SAMI data to analyse the data all at once.
- It takes output from any ifs type data, it works with LZIFU, SAMI DR3 and S7 Survey data products so it could be expanded for use on MANGA, Hector etc with only minor updates required.
- It takes the output of the emission line fits as well as the data cubes and can execute data quality and signal to noise cuts and add additional metadata for galaxies etc
- It calculates star formation rates, emission line ratios, metallicities using about 12 different calibrations etc and is flexible for different requirements eg change the extinction curve.
- Stored in HDF format using the Pandas library. Each row corresponds to an individual spaxel in an individual galaxy so is easily indexed.
- The code only needs to be run once and then saved to disc to use again in the future (20 sec upload).
- It could be used to ingest all of the Hector emission line fits.
- The code has been used with the most recent SAMI paper which is currently under review, but hasn't been published yet. Henry would like people to test Spaxelsleuth. Examples of SAMI Galaxy plots to demonstrate data plots that can be easily generated. PPT diagrams can also be generated.



- It produces 2 data frames. The metadata data frame, which gives stellar masses and redshifts etc for individual galaxies and has signal to noise measurements of the data cubes, coordinates, redshifts etc. There are lots of columns generated in the data frame (eg galaxy properties, star formation rates, surface densities, emission line fluxes, kinematics etc), It also has flags to show the reliability of the data for a particular aspect within each spaxel. Plots can currently be made for the entire SAMI data set.
- It is a flexible plotting interface. A test suite is also available to check changes made.
- Henry is working with Gabby to look at what the changes may be needed based on the output of her code.
- It could potentially be used on all data hosted by Data Central.

Action Items:

- Contact Henry if you would like to volunteer to test Spaxelsleuth.

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Other Business

- There was no other business.

The next Hector Science meeting is scheduled for Tue 8 August 2023, 3 - 4pm AEST

Meetings will continue alternately on the 2nd Tue and Wed of each month at 3 - 4pm AEST (1 – 2pm AWST).