Overview of the HI SWG needs in the context of SRCs

Lourdes Verdes-Montenegro

Instituto de Astrofísica de Andalucía (CSIC)



Co-chair of the HISWG (together with Sarah Blyth)

History of gas in our universe through the study of atomic HI line emission and absorption



Blok et al 2015, Picture courtesy B. Koribalski

27th March 2018, AENEAS all-hands meeting (Nice)

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Trying to be...

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Trying to be...

- ...on behalf of the HI SWG
- ...feedback of interest for AENEAS WPs

27th March 2018, AENEAS all-hands meeting (Nice)

SKAI SCIENCE GOALS. HI SCIENCE

Goal	SWG	Objective	SW
1	CD/EoR	Physics of the early universe IGM - I. Imaging	1/3
2	CD/EoR	Physics of the early universe IGM - II. Power spectrum	2/:
3	CD/EoR	Physics of the early universe IGM - III. HI absorption line spectra (21cm forest)	3/3
4	Pulsars	Reveal pulsar population and MSPs for gravity tests and Gravitational Wave detection	1/:
5	Pulsars	High precision timing for testing gravity and GW detection	1/
6	Pulsars	Characterising the pulsar population	2/
7	Pulsars	Finding and using (Millisecond) Pulsars in Globular Clusters and External Galaxies	2/
8	Pulsars	Finding pulsars in the Galactic Centre	2/
9	Pulsars	Astrometric measurements of pulsars to enable improved tests of GR	2/
10	Pulsars	Mapping the pulsar beam	3/
11	Pulsars	Understanding pulsars and their environments through their interactions	3/
12	Pulsars	Mapping the Galactic Structure	3/
13	HI	Resolved HI kinematics and morphology of ~10^10 M_sol mass galaxies out to z~0.8	1/
14	HI	High spatial resolution studies of the ISM in the nearby Universe.	2/
15	HI	Multi-resolution mapping studies of the ISM in our Galaxy	3/
16	н	Hi absorption studies out to the highest redshifts.	4/
17	HI	The gaseous interface and accretion physics between galaxies and the IGM	5/
18	Transients	Solve missing baryon problem at 2°2 and determine the Dark Energy Equation of State	=1
19	Transients	Accessing New Physics using Ultra-Luminous Cosmic Explosions	=1
20	Translents	Galaxy growth through measurements of Black Hole accretion, growth and feedback	3/
21	Transients	Detect the Electromagnetic Counterparts to Gravitational Wave Events	4/
22	Cradle of Life	Map dust grain growth in the terrestrial planet forming zones at a distance of 100 pc	1/
23	Cradle of Life	Characterise exo-planet magnetic fields and rotational periods	2/
24	Cradle of Life	Survey all nearby (~100 pc) stars for radio emission from technological civilizations.	3/
25	Cradle of Life	The detection of pre-biotic molecules in pre-stellar cores at distance of 100 pc.	4/
26	Cradle of Life	Mapping of the sub-structure and dynamics of nearby clusters using maser emission.	5/
27	Magnetism	The resolved all-Sky characterisation of the interstellar and intergalactic magnetic fields	1/
28	Magnetism	Determine origin, maintenance and amplification of magnetic fields at high redshifts - I.	2/
29	Magnetism	Detection of polarised emission in Cosmic Web filaments	3/
30	Magnetism	Determine origin, maintenance and amplification of magnetic fields at high redshifts - II.	4/
31	Magnetism	Intrinsic properties of polarised sources	5/
32	Cosmolagy	Constraints on primordial non-Gaussianity and tests of gravity on super-horizon scales.	1/
33	Cosmology	Angular correlation functions to probe non-Gaussianity and the matter dipole	2/
34	Cosmology	Map the dark Universe with a completely new kind of weak lensing survey - in the radio.	3/
35	Cosmology	Dark energy & GR via power spectrum, BAO, redshift-space distortions and topology.	4/
36	Cosmology	Test dark energy & general relativity with fore-runner of the 'billion galaxy' survey.	5/
37	Continuum	Measure the Star formation history of the Universe (SFHU) - I. Non-thermal processes	1/
38	Continuum	Measure the Star formation history of the Universe (SFHU) - II. Thermal processes	2/
39	Continuum	Probe the role of black holes in galaxy evolution - I.	3/
40	Continuum	Probe the role of black holes in galaxy evolution - II.	4/
41	Continuum	Probe cosmic rays and magnetic fields in ICM and cosmic filaments.	5/
42	Continuum	Study the detailed astrophysics of star-formation and accretion processes - I.	5/
43	Continuum	Probing dark matter and the high redshift Universe with strong gravitational lensing.	7/
44	Continuum	Legacy/Serendipity/Rare.	8/

Table 1. Collated list of science goals. Within each science area, the entries are ordered in the rank provided by the SWG Chairs. The eight different groups of SWG contributions are listed in the Table in an arbitrary sequence.

SKAI SCIENCE GOALS. HI SCIENCE

135/0	ience ioal	SWG	Objective	SWG Rank				
	1	CD/EoR	Physics of the early universe IGM - I. Imaging	1/3	SKAI SCIENCE PR	RIORITY OUTCOMES		
	2	CD/EoR	Physics of the early universe IGM - II. Power spectrum	2/3				
	3	CD/EoR	Physics of the early universe IGM - III. HI absorption line spectra (21cm forest)	3/3	Document number	SKA-TEL-SKO-0000122		
-	4	Pulsars	Reveal pulsar population and MSPs for gravity tests and Gravitational Wave detection	1/3		SCI-REQ-RE		
	5 6	Pulsars Pulsars	High precision timing for testing gravity and GW detection Characterising the pulsar population	2/3	Revision			
	7	Pulsars	Finding and using (Millisecond) Pulsars in Globular Clusters and External Galaxies	2/3	Date	2014-09-25		
S	SWG		Objective	FOR PROJECT USE ONLY Released				
CL	D/Eoł	R	Physics of the early universe IGM - I. Imaging			2014/09/25		
CL	D/Eoł	R	Physics of the early universe IGM - II. Power spectrum	ו				
Ρι	ulsars	s	Reveal pulsar population and MSPs for gravity tests a	nd Gravit	tational Wave detection			
Pl	uisurs	S	might precision thring for testing gravity and Gw dete					
	HI		Resolved HI kinematics and morphology of ~10^10 M					
	HI		High spatial resolution studies of the ISM in the nearby Universe.					
	HI		Multi-resolution mapping studies of the ISM in our Ga					
	าเรายา		Solve missing baryon problem at z 2 and determine t					
Crad		5	Map dust grain growth in the terrestrial planet forming					
	gneti		The resolved all-Sky characterisation of the interstella					
Cosi	molo	gy	Constraints on primordial non-Gaussianity and tests of					
	Cosmology		Angular correlation functions to probe non-Gaussiani					
	atinut a	IM Losmanagy	Star formation history of the Universe (SFHU) – I+II. N	lon-thern	nal + Thermal processes			
	37	Continuum	Measure the Star formation history of the Universe (SFHU) - I. Non-thermal processes	1/8				
24	38	Continuun		2/8				
	39	Continuun		3/8				
	40	Continuum Continuum		4/8				
	42	Continuum		5/8				
	43	Continuun		7/8				
4	44	Continuum		8/8				
Table	a 1. Col	llated list	of science goals. Within each science area, the entries are ordered in the	rank				

each science are provided by the SWG Chairs. The eight different groups of SWG contributions are listed in the Table in an arbitrary sequence.

PREVIOUS RELATED DISCUSSIONS

- In November 2015 there was an SDP/science working group meeting in which the HISWG was represented by Attila Popping
- A document was circulated on "Science Data Processor: anticipated data products"
- The HISWG gave comments/requests to the SDP
- This feedback was gathered by the SDP with no particular agreement reached but the plan was
 - this to be the beginning of further discussions on what could be realistic,
 - Post processing by SWGs will have to be done by computing nodes or centres outside the central processor

Note that:

- This meeting was previous to the decision by the Board (April 2016) confirming its preference for a regional network model for provision of science data
- So now the feedback should have as a starting point the boundary between the SDP and the SRCs

BASED ON

- Update from Rosie Bolton March 2018 on the SDP/SRCs boundaries (from SDP Architecture)
 == Talk yesterday
- What should I ask that can be useful...?

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SKAI SCIENTIFIC USE CASES** (2016-01-29)

• Initial set of requirements extracted from the sample use cases scenarios indicated below (that intended to serve to guide requirements for SKAI design)

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	1.2	Scope of the document
		•
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	1.2	Reference documents
3		Scientific use case examples
	3.1	A sensitive measurement of the power spectrum of 21cm brightness temperature
		fluctuations and tomographic cubes during the EoR and the Cosmic Dawn
	3.2	Global EoR with SKA1-LOW
	3.3	A blind HI 21-cm absorption line survey at 3 <z<6 (200="" 19<="" 350="" mhz)="" ska1-low="" th="" using="" –=""></z<6>
	3.4	SKA1 All-Sky HI Survey
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**SKA-TEL-SKO-0000015_Rev_03_SKA1_SCIENCE_USE_CASES_COMBINED-PART-1-SIGNED.PDF

SKAI SCIENTIFIC USE CASES (2016-01-29)

				DATA ANALYSIS	
3.4	SKA1 All-Sky HI	Survey		Procedures required	RFI mitigation, flagging, calibration, continuum subtraction, widefield imaging, mosaicing, source-finding and source
PRC	JECT DETAILS				parameterisation Likely processing issues:
Title		SKA1 All-Sky H	l Survey	Processing	Large data volumes
Prir	cipal Investigator	Oort		considerations	 Widefield images with non-coplanar baselines
Co-	Authors	HI-Galaxy SWG	i		 Accurate primary beam for mosaicing
Tim	e Request	10,000 hrs			 Flagging of RFI
FAC	ILITY	Preconditions			 Requirement to search cubes multiple times (source)
					detection).
	SKA1-LOW				 Requirement to stack at a given set of coordinates Stokes I data cubes; image cut-outs; spectra; minicubes;
2				Data products	catalogues
	SKA1-MID				Collect visibilities on multiple days
				Pipeline	Apply barycentric correction
REC	EIVER(S) REQUIRED		Time (hrs)		Apply flagging
	SKA1-LOW				 Calibrate visibilities
	SKA1-MID Band 1				 Peel strong continuum sources
2	SKA1-MID Band 2		10,000		 Subtract remaining continuum sources using global sky model
	SKA1-MID Band 3				 Make daily cubes at multiple resolutions for each pointing
	SKA1-MID Band 4				 Combine cubes (and beams) for individual pointings in
	SKA1-MID Band 5				the image domain
					 Residual polynomial continuum subtraction in image
OPE	ERATIONAL MODE		Details		domain
(as	defined in Concept-of-	Operations)			 Linear mosaicking of multiple fields, followed by cutouts
2	Normal		Mosaic observations		 In RA, Dec, Freq Multiscale deconvolution of strongest sources
	Fixed schedule (giv			Quality assessment plan & cadence	Inspect RFI occupancy plots
	Time-critical overri	de		quarty assessment plan & obtained	 Examine rms and histogram of pixel values in daily cubes.
	Custom Experiment				 Compare flux densities of known sources in daily cubes.
2	Commensal		Continuum, polarisation, co	Latency (Desired time lag between	On completion of observations and data reduction
	Collaborative & Co			Latency	
	Sub-arrays required	d		seme aranasatin the arentre. 45.	
				This could range from 'a few seconds' for transient detections using the fast	
				imaging pipeline, to 'upon completion	
				of scheduling block and pheline	
				reduction' (approximately 24 hours),	
				to 'at completion of the full project'.)	

SKAI SCIENTIFIC USE CASES (2016-01-29)

					DATA ANALYSIS	
3	.4 S	KA1 All-Sky HI S	Survey		Procedures required	RFI mitigation, flagging, calibration, continuum subtraction, widefield imaging, mosaicing, source-finding and source
	PROJECT DETAILS					parameterisation Likely processing issues:
	Title SKA1 All-Sky HI Survey			Survey	Processing	Large data volumes
	Principal Investigator Oort				considerations	 Widefield images with non-coplanar baselines
Co-Authors HI-Galaxy SWG					 Accurate primary beam for mosaicing 	
	Time	Request	10,000 hrs			 Flagging of RFI
	FACILI		Preconditions			Requirement to search cubes multiple times (source
						detection).
		SKA1-LOW			1	Requirement to stack at a given set of coordinates Steles L data subast image out outs spectra, minimulas
					Data products	Stokes I data cubes; image cut-outs; spectra; minicubes; catalogues
	2	SKA1-MID				Collect visibilities on multiple days
					Pipeline	Apply barycentric correction
	RECE	VER(S) REQUIRED		Time (hrs)	· · · · · · · · · · · · · · · · · · ·	Apply flagging
		SKA1-LOW				Calibrate visibilities
		SKA1-MID Band 1				 Peel strong continuum sources
	2	SKA1-MID Band 2		10,000		 Subtract remaining continuum sources using global sky
		SKA1-MID Band 3				model
		SKA1-MID Band 4				 Make daily cubes at multiple resolutions for each pointing Combine subes (and becaus) for individual pointings in
		SKA1-MID Band 5				 Combine cubes (and beams) for individual pointings in the image domain
						 Residual polynomial continuum subtraction in image
	OPER	ATIONAL MODE		Details		domain
		fined in Concept-of-	Operations)			 Linear mosaicking of multiple fields, followed by cutouts
	2	Normal		Mosaic observations		in RA, Dec, Freq
		Fixed schedule (give	e cadence)			 Multiscale deconvolution of strongest sources
		Time-critical overrid			Quality assessment plan & cadence	 Inspect RFI occupancy plots
	Custom Experiment			1	 Examine rms and histogram of pixel values in daily cubes. Compare flux densities of known sources in daily cubes. 	
	Commensal			Continuum, polarisation, co	Latency (Desired time lag between	 Compare flux densities of known sources in daily cubes. On completion of observations and data reduction
	Collaborative & Coordinated			Latency	on completion of observations and data reduction	
		Sub-arrays required	1			
					This could range from 'a few seconds'	
Last week feedback: from three HI			three HI	for transient detections using the fast imaging pipeline, to 'upon completion of scheduling block and pipeline		
Ŀ	SWO	G members,	including	myself	reduction' (approximately 24 hours), to 'at completion of the full project'.)	

SKAI SCIENTIFIC USE CASES (2016-01-29)

_					DATA ANALYSIS	
3.4	4 S	KA1 All-Sky HI S	Survey		Procedures required	RFI mitigation, flagging, calibration, continuum subtraction, widefield imaging, mosaicing, source-finding and source
PROJECT DETAILS						parameterisation Likely processing issues:
	Title SKA1 All-Sky HI Survey			Survey	Processing	Large data volumes
		pal Investigator	Oort		considerations	 Widefield images with non-coplanar baselines
		thors	HI-Galaxy SWG			 Accurate primary beam for mosaicing
ŀ	Time	Request	10,000 hrs			Flagging of RFI
	FACIL		Preconditions			 Requirement to search cubes multiple times (source
						detection).
		SKA1-LOW				Requirement to stack at a given set of coordinates
					Data products	Stokes I data cubes; image cut-outs; spectra; minicubes; catalogues
	2	SKA1-MID				Collect visibilities on multiple days
					Pipeline	Apply barycentric correction
	RECE	VER(S) REQUIRED		Time (hrs)		Apply flagging
		SKA1-LOW			1	Calibrate visibilities
		SKA1-MID Band 1				 Peel strong continuum sources
	2	SKA1-MID Band 2		10,000		 Subtract remaining continuum sources using global sky
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		SKA1-MID Band 5				the image domain
						 Residual polynomial continuum subtraction in image
	OPER	ATIONAL MODE		Details		domain
	(as de	fined in Concept-of-	Operations)			 Linear mosaicking of multiple fields, followed by cutouts
	2	Normal		Mosaic observations		in RA, Dec, Freq
		Fixed schedule (give	e cadence)		Quality assessment plan 9 sodepes	Multiscale deconvolution of strongest sources
	Time-critical override			Quality assessment plan & cadence	 Inspect RFI occupancy plots Examine rms and histogram of pixel values in daily cubes. 	
	Custom Experiment				 Compare flux densities of known sources in daily cubes. 	
	Commensal Continuum, polarisation, cc		Latency /Desired time lag between	On completion of observations and data reduction		
		Collaborative & Coo	ordinated		Latency	-
Sub-arrays required				Being Brandole in the Brenter e.g.		
_			Last	midnight	This could range from 'a few seconds' for transient detections using the fast	
Last week feedback: from four HI			four HI	imaging pipeline, to 'upon completion of scheduling block and pipeline		
S	W	G members,	including	myself	reduction' (approximately 24 hours), to 'at completion of the full project'.)	

PIPELINES

1	6
	n

HI

HI absorption studies out to the highest redshifts.

10		don studies out to the highest reashints.	
at 3 <z<6 SKAI-LOW, 50 unique poi 3.7 An all-sky Mid- Band I, Hide Band I,</z<6 	121-cm absorption line survey 5000 hrs ntings × 100 h absorption survey at z~1 - 3 1,000 h, Individual pointings	 3.4 SKA1 All-Sky HI Survey 3.6 Medium-Deep HI Imaging Survey 3.9 Deep HI Imaging Survey 3.10 Medium-Wide HI Imaging Survey Mid-Band 2, Mid- Band 1 x 310,000 h, 2,000 h, 3000 h, 2000h Mosaic observations, 20,000 targets, One deep field, Single pointing Imaging Imaging Im	3.5 Deep Galactic and Magellanic HI Survey Mid- Band 2, 4,500 h, Maps through multiple fields of view, 1,200 targets 3.8 Cosmic VVeb:The extended environment of galaxies and the IGM Mid- Band 2, 100 h, Individual pointings with multiple objects 3.11 High spatial resolution imaging of the HI in nearby galaxies Mid- Band 2, 300 h, multiple fields of view Mid- Band 2, 300 h, multiple fields of view Mid- Band 2 , 300 h, multiple fields of view
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13	HI	Resolved H	I kinematics and morphology of ~10^10 N	1_sol mass galaxies out to z~0.8
3.3 A blind HI 21-cm absorption line survey at 3 <z<6 SKA1-LOVV, 5000 hrs 50 unique pointings × 100 h 3.7 An all-sky absorption survey at z~1 - 3 Mid- Band I, I,000 h, Individual pointings</z<6 			 3.4 SKAI All-Sky HI Survey 3.6 Medium-Deep HI Imaging Survey 3.9 Deep HI Imaging Survey 3.10 Medium-Wide HI Imaging Survey Mid-Band 2, Mid- Band 1 × 310,000 h, 2,000 h, 3000 h, 2000h Mosaic observations, 20,000 targets, One deep field, Single pointing Imaging Imaging Im	 3.5 Deep Galactic and Magellanic HI Survey Mid- Band 2, 4,500 h, Maps through multiple fields of view, 1,200 targets 3.8 Cosmic Web: The extended environment of galaxies and the IGM Mid- Band 2, 100 h, Individual pointings with multiple objects 3.11 High spatial resolution imaging of the HI in nearby galaxies Mid- Band 2, 300 h, multiple fields of view Mid- Band 2, 300 h, multiple fields of view
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 RFI mitigation and flagging Gain calibration Generate continuum visibility dataset Generate continuum image Apply the self-calibration solutions and direction-dependent corrections to the spectral line visibility dataset Subtract continuum from the line dataset Doppler correct (CVEL) line dataset Generate stokes-I spectral-line cube for full FoV at 4.6 kHz resolution Deconvolve channels with line detections, if needed. Calibrated continuum and spectral line visibilities to be combined with the data from other observing runs to generate `final' stokes-I spectral-line cube(s).		ons and s to the ne dataset taset cube for full detections, if line e data from	 Collect visibilities on multiple days Apply barycentric correction Apply flagging Calibrate visibilities Peel strong continuum sources Subtract remaining continuum sources using global sky model / Polynomial continuum subtraction Daily cubes at multiple resolutions for each pointing (will SDP produce the required number?) Combine cubes (and beams) for individual pointings in the image domain Residual cont. subtraction in image domain Multiscale deconv. of strongest sources Residual polynomial continuum subtraction in image domain Linear mosaicking of multiple fields, followed by cutouts in RA, Dec, Freq 	 Calibration, flagging, imaging Combination of spectral line data cubes from different observing runs Gridding the UV data so that new data can be combined in this grid as it is observed. 				

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PROCEDURES REQUIRED

PROCESSING CONSIDERATIONS

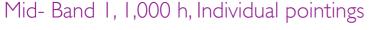
DATA PRODUCTS

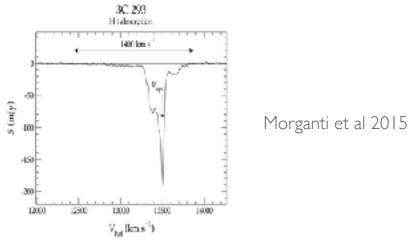
3.3 A blind HI 21-cm absorption line survey at 3<z<6

SKAI-LOW, 5000 hrs

50 unique pointings x 100 h

3.7 An all-sky absorption survey at $z \sim I - 3$





Procedures required, not in the SDP

Processing considerations

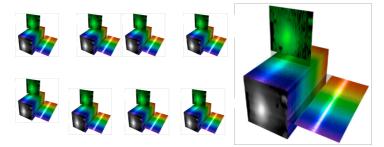
Reprocessing of calibrated visibilities

Data products

- Stokes I continuum visibility datasets and images at 225, 275 and 325 MHz
- Stokes I spectral-line cube over 200 350 MHz with 4 kHz resolution
- Cubelets and spectra towards all the sources brighter than 10 mJy in the FoV along with the RFI flags applied to the data.

Continuum source and spectral line catalogs Continuum image with 30% bandwidth centered at 600 MHz. This will be used to check the total flux density of the background source which should further be logged in a public database for future sky-model **referenc**e

3.4 SKAT All-Sky HI Survey 3.6 Medium-Deep HI Imaging Survey 3.9 Deep HI Imaging Survey 3.10 Medium-Wide HI Imaging Survey Mid-Band 2, Mid-Band 1 x 310,000 h, 2,000 h, 3000 h, 2000h Mosaic observations, 20,000 targets, One deep field, Single pointing



Procedures required, not in the SDP

- source-finding and source parameterisation
- data combination to created integrated deep cube (uv and image domain)

Processing considerations

Large data volumes, search cube multiple times (source detection), stacking

Data products

- Stokes I data cubes
- Calibrated, imaged, continuum subtracted datacubes
- image cut-outs
- spectra
- minicubes
- catalogues
- moment maps
- masks used to make moment maps
- signal-to-noise maps

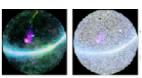
3.5 Deep Galactic and Magellanic HI Survey

Mid-Band 2, 4,500 h, Maps through multiple fields of view, 1,200 targets

3.8 Cosmic Web: The extended environment of galaxies and the IGM Mid-Band 2, 100 h, Individual pointings with multiple objects

3.11 High spatial resolution imaging of the HI in nearby galaxies

Mid-Band 2, 300 h, multiple fields of view





McClure-Griffiths et al 2015 Agertz, Teyssier, Moore 2009

Procedures required, not in the SDP

- Image cubes at multiple resolutions (will SDP produce the required number?).
- Addition of single dish data for imaging.
- joint deconvolution of mosaic;
- Multi-scale deconvolution;
- Addition of single-dish data for intaging

Processing considerations

Large data volumes due to full spectral resolution?

Data products

- Fully calibrated I, Q, U and V cubes at full spectral resolution
- Image cubes, moment maps, images of the PS
- Data cubes, Total HI image, velocity field, velocity dispersion map. At various resol.
- masks used to make moment maps
- signal-to-noise maps

MAIN CHARACTERISTICS OF THE DATA PRODUCTS

- Volumes:

- SKAIMID, Band 2: Discovery cube size 2.6Pbytes. HI science a fraction down to 1/10 of the max. Extracted data products at least 10 times smaller (moment maps, pos.vel cuts, spectra)
- continuum data products or spectral postage stamp cubes would be orders of magnitude smaller than the discovery cube

- Formats:

- ongoing work by ICRAR-IT on the jp2 and jpx formats could feed perfectly into the requirements of efficiently extracting sub-cubes of various resolutions from a huge master cube.

- Metadata:

- ...

- E.g. for spectra, description of the parameters that went into making them, like the size of the extraction region.

POTENTIAL SOFTWARE TO INTEGRATE IN THE SRCs SCIENCE PLATFORM

- Potential candidates:
 - Developed by SWGs, KSPs, precursors/pathfinders:
 - Analysis, e.g. SoFiA, TiRiFiC, GalAPAGOS, GIPSY/GuiPSY, 2DBAT, FAT, MAGMO, Barolo, GBKFit, CASA, etc (TBD)
 - Visualization: e.g SlicerAstro, VISIONS, X3D
 - Interaction/connection with the VO (e.g. in order to request complementary data or input data for modeling; e.g GuIPSY is connected with Topcat and Aladin)

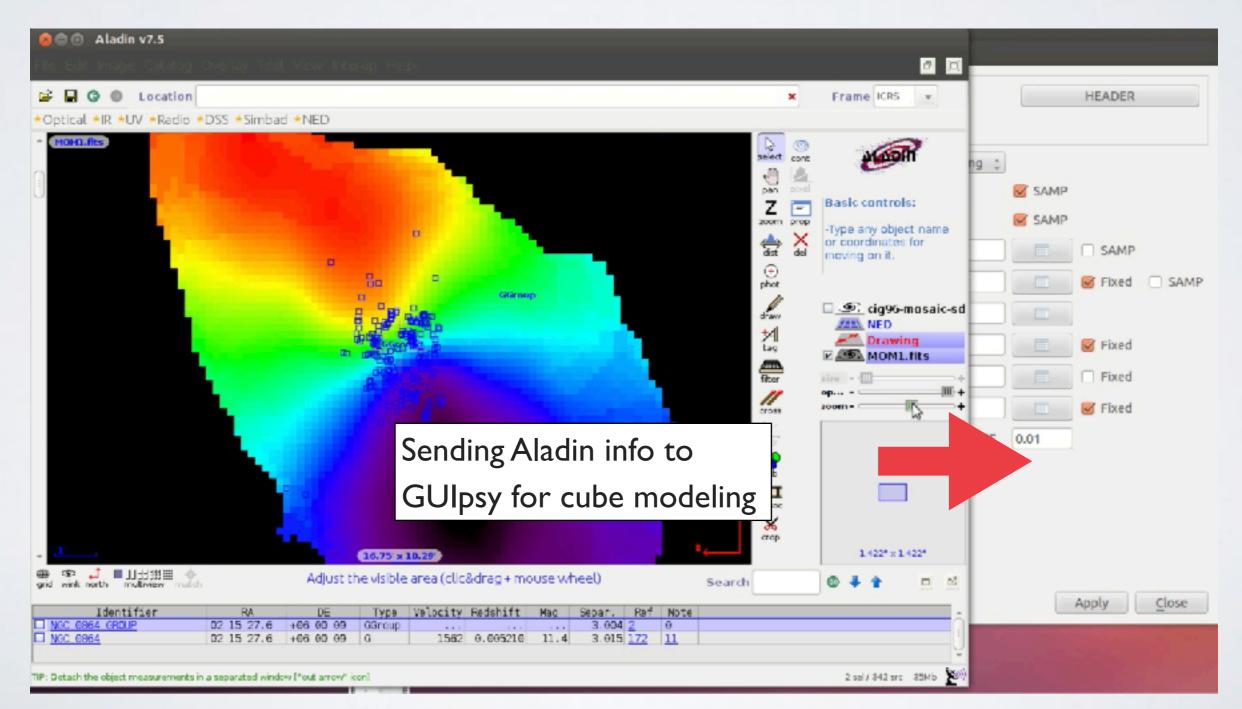
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E.g.: GUIPSY: Graphical User Interface for Groningen Image Processing Package

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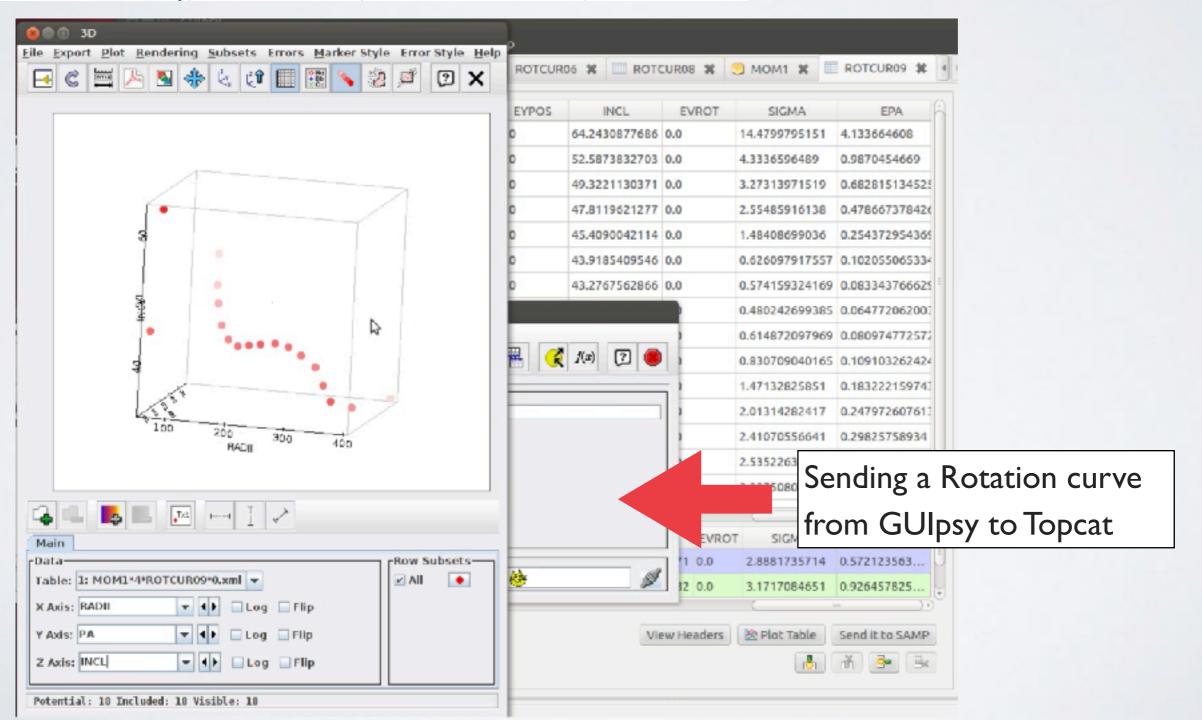
E.g.: GUIPSY: Graphical User Interface for Groningen Image Processing Package



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E.g.: GUIPSY: Graphical User Interface for Groningen Image Processing Package



OTHERS

- Other items/feedback:

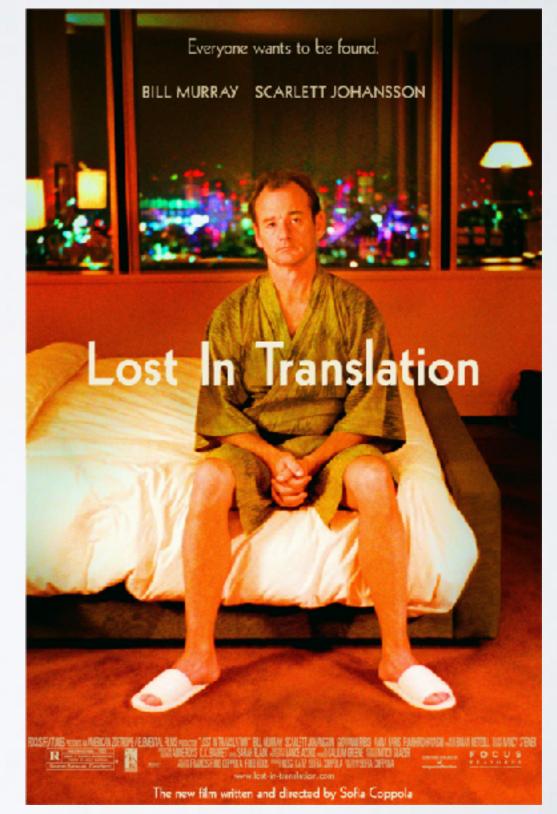
- Should discuss within the SWG if interested in reuse of SDP pipelines in the SRCs (e.g imaging with different parameters)
- Commensality?
- Will need flexibility to adapt the processing strategy once the precursors/ pathfinders are underway
- Where to find some details of the computing systems already envisaged at this stage?

(MY) CONCLUSIONS

In order to allow mutual feedback between astronomers/SWGs and SRCs designers there is something we should avoid:

(MY) CONCLUSIONS

In order to allow mutual feedback between astronomers/SWGs and SRCs designers there is something we should avoid:





Proposed a Session for the next SKA Science meeting (QI 2019) on mutual knowledge of the overlapping areas between these perspectives:

MY ACTION

- Science teams working on KSP preparation, summarizing the kind of tools they are considering, in many cases building on top of on-going works with precursors/ pathfinders.
- **SDP,** on what pipelines are being considered, and how the interaction with the scientific teams is taking place, and what will be the products that the SDP will deliver
- **SRCCG**, on how the requirements are being defined and how those are expected to fulfill the needs of the community
- Initiatives to prepare for the SRCs: AENEAS, ERIDANUS, IDIA, Canada, India, etc
- **SKA data challenges**, that will be of much interest also for the algorithm and pipeline development
- And how do PI projects fit in and in what measure is needed and possible to plan ahead for those