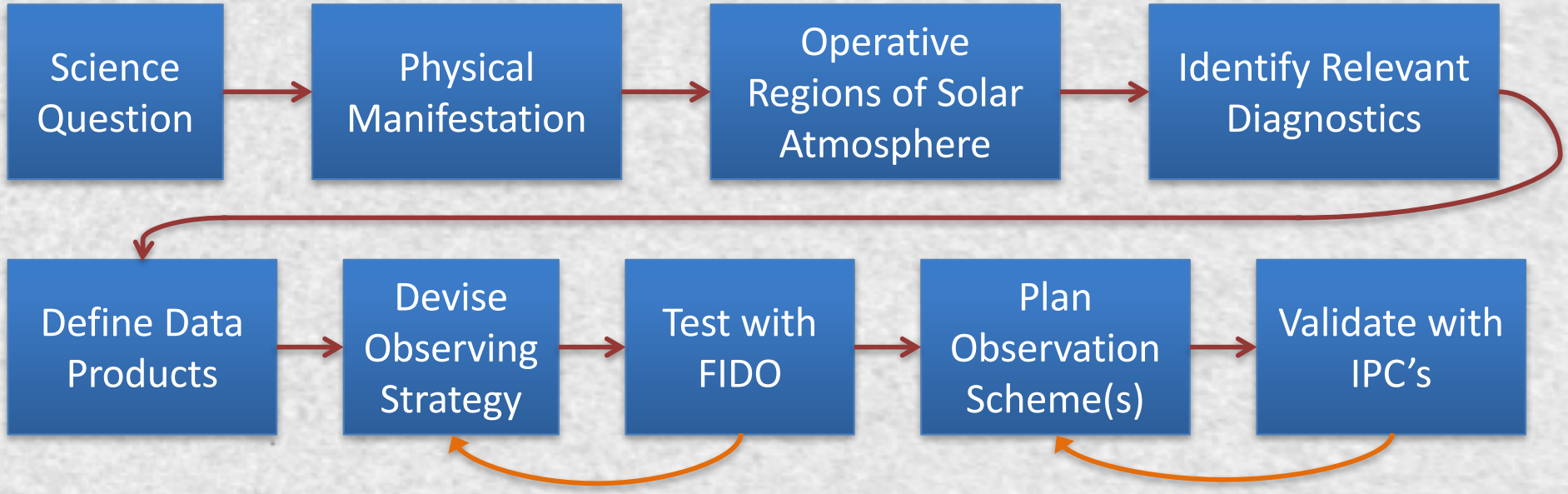
DKIST CSP Workshop
Newcastle, England
9 April 2018

DKIST Critical Science Plan Workshop #5:
Wave generation and propagation

JIRA: Writing a Science Use Case – Getting started



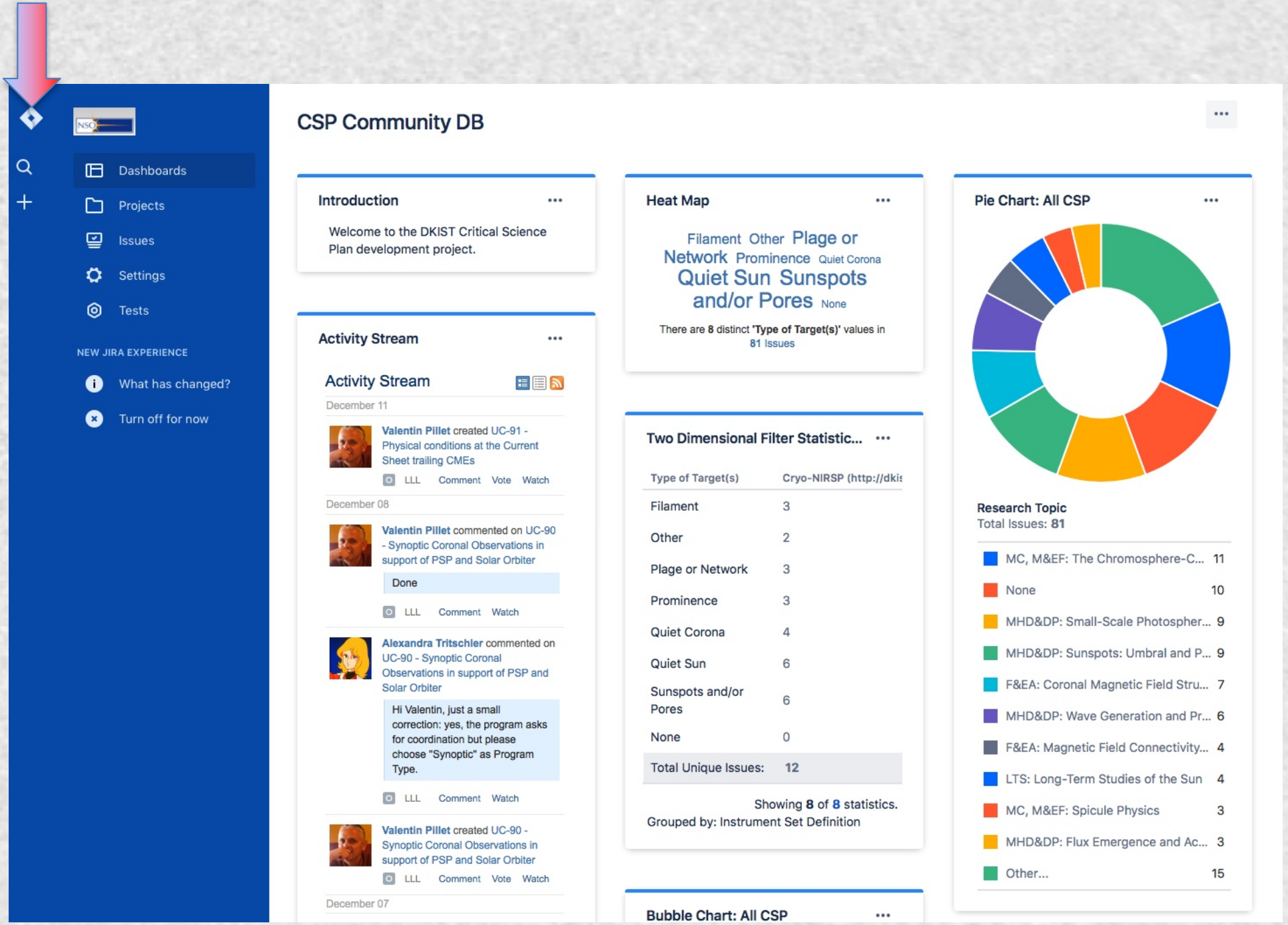
http://nso-atst.atlassian.net/

Collaborative JIRA environment for Science Use Case development

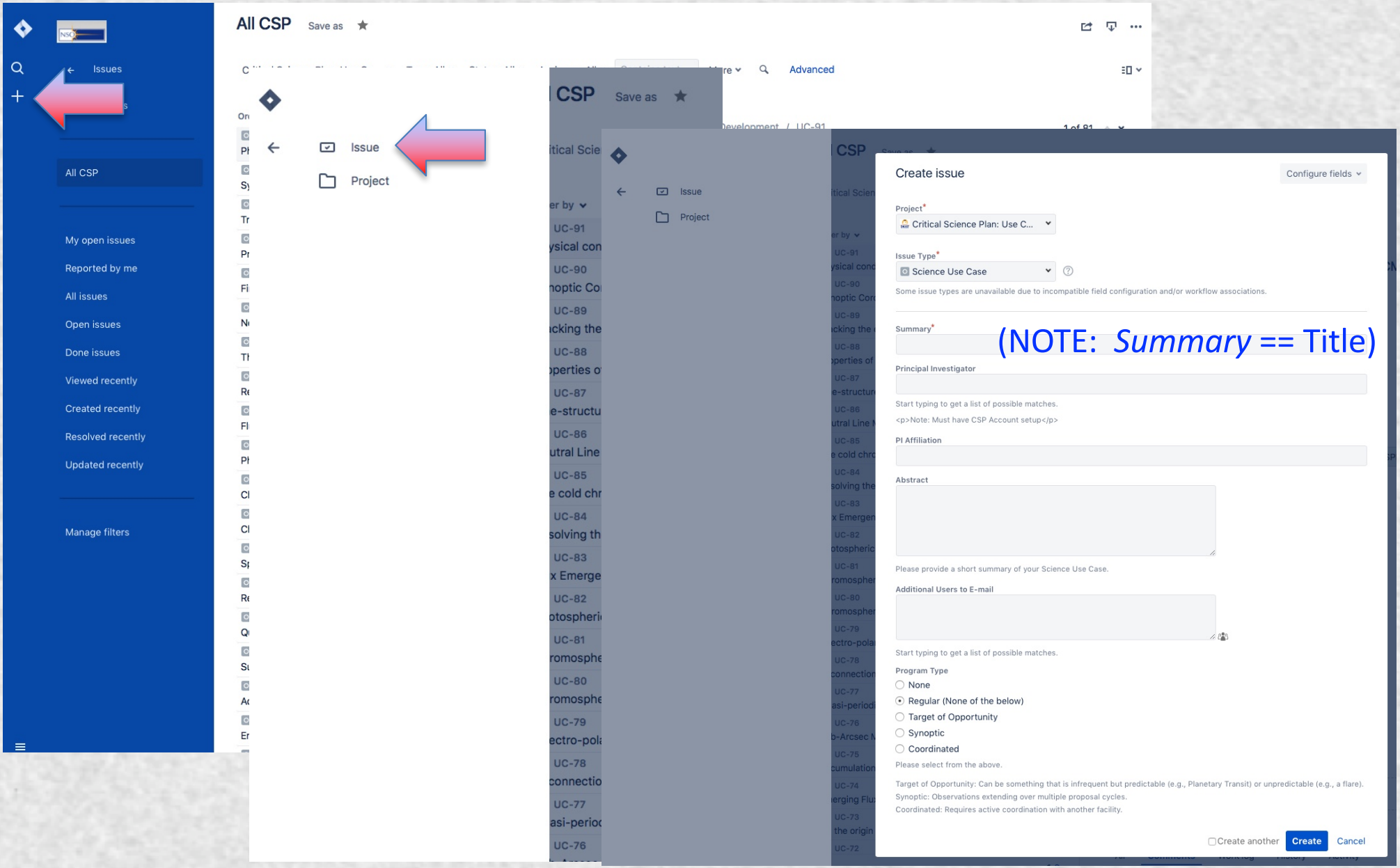
If you do not yet have an account, email an account request to:

DKISTCSP@nso.edu

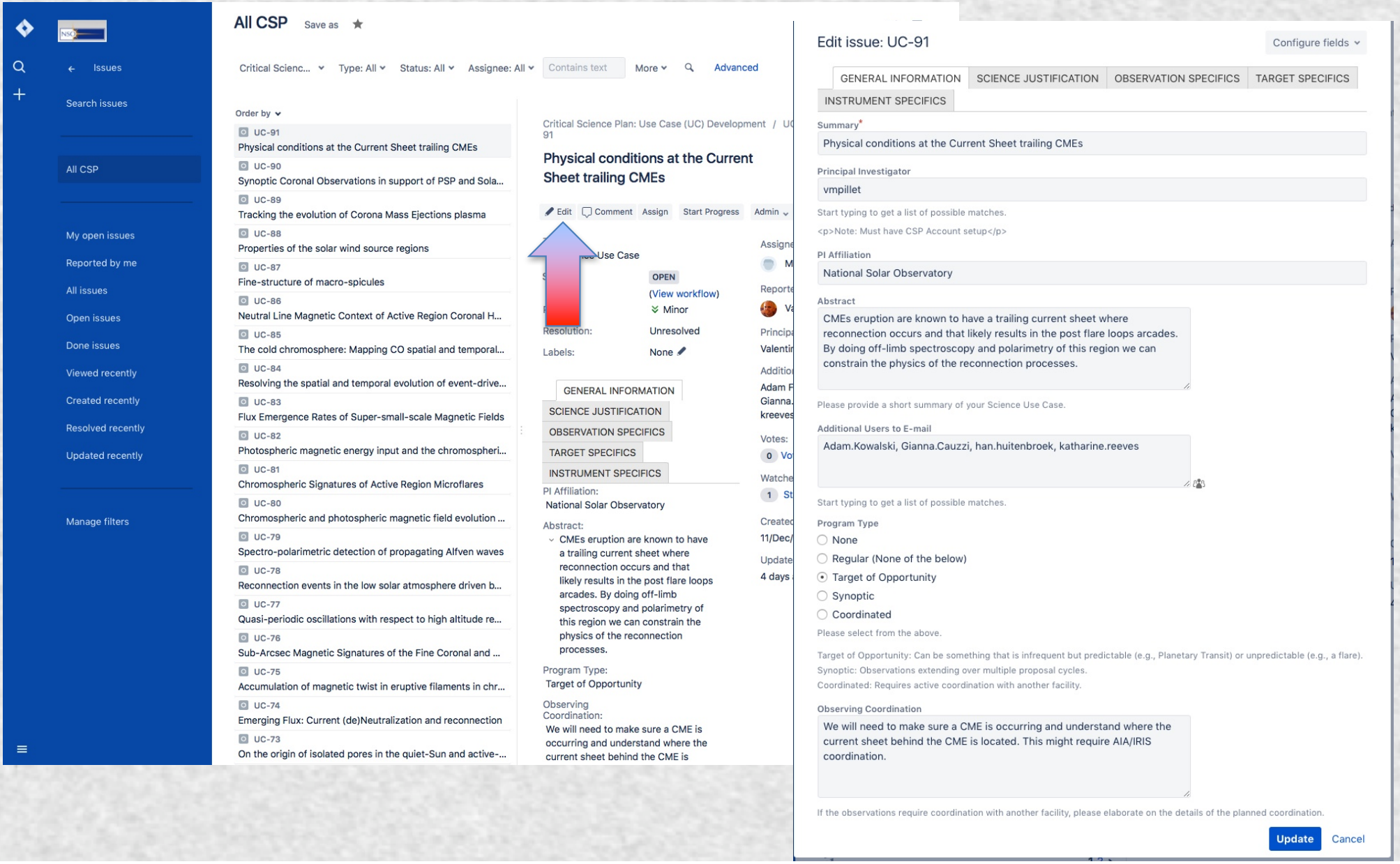
DKIST CSP JIRA Site (https://nso-atst.atlassian.net/secure/Dashboard.jspa)



Create a new Science Use Case



DKIST CSP: JIRA User's Guide
Editing your Science Use Case (PI, Co-I)



DKIST CSP Science Use Case development strategy:

1. Formulate science context and goals

   (JIRA form tabs – General Information, Science Justification, Target Specifics)

2. Identify observational needs (spectral lines of interest, pattern, cadence, sensitivities)

   (JIRA form tab – **Observation Specifics**, Instrument Specifics)

3. Determine useful DKIST instrument suite

   (JIRA form tabs – Observation Specifics, Instrument Specifics)

   FIDO – aka Coudé configuration and Data Rate tool, aka Beam Splitter Tool

4. Assess instrument performance capabilities

   (JIRA form tabs – Instrument Specifics)

   Instrument Performance Calculators (IPCs)

Determine useful DKIST instrument suite

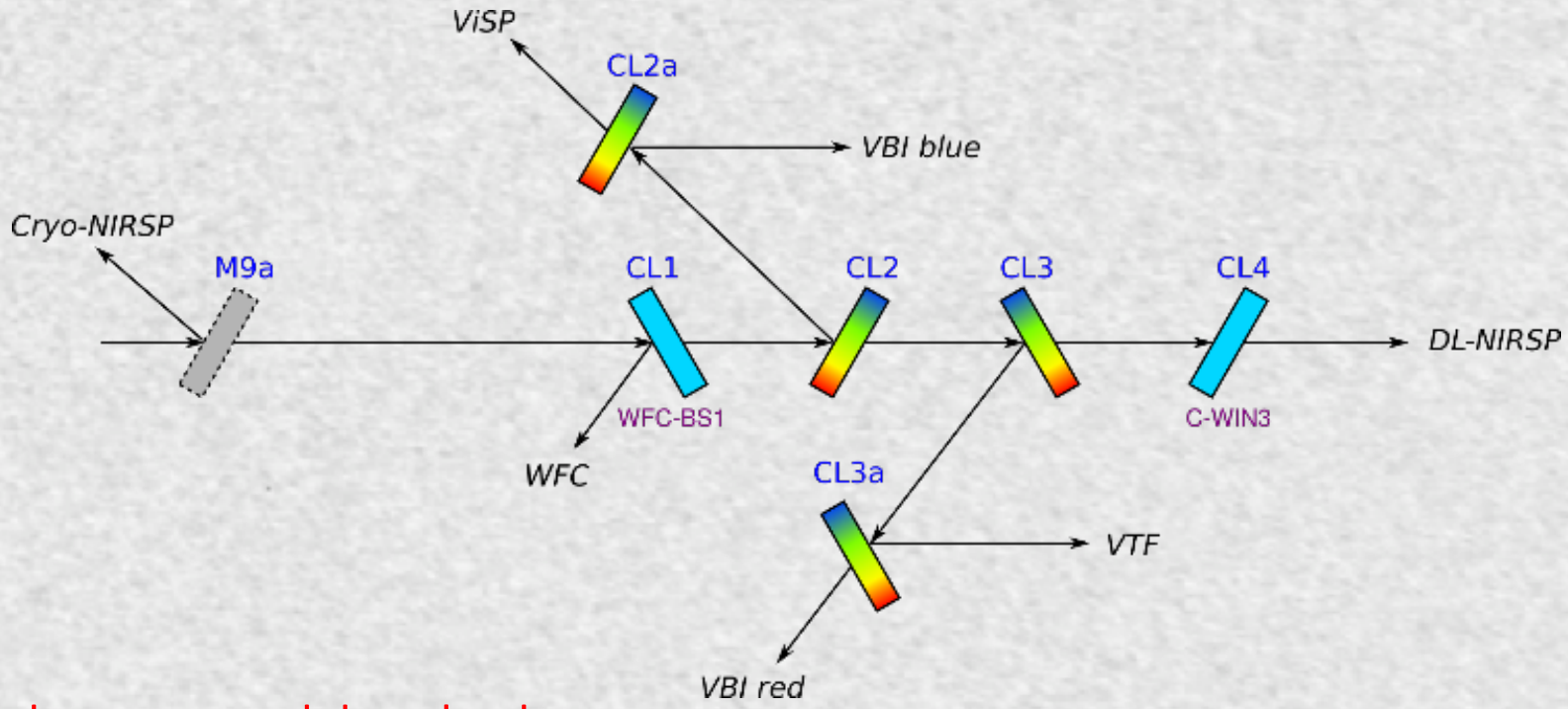
DKIST Instrument Summary Table

http://dkist.nso.edu/CSP/instruments

	Instrument type	Spectral range	Spectral resolution	Spatial sampling	Maximum Instantaneous Field of View	Maximum Sampled Field of View	Peak Cadence	Analogous Instruments
Visible Broadband Imager ***VBI (Blue)***	High Cadence, High Resolution Imager	390–550nm (sequential filter sequencing)	N/A	0.011″	45″ x 45″	2′ x 2′ (sequential field sampling)	3.2 sec (reconstructed) 0.03 sec (raw images)	ROSA, Hinode/BFI *High cadence, high spatial resolution*
Visible Spectropolarimeter ***ViSP***	Scanning Slit Spectropolarimeter	380-900nm (3 spectral windows at a time)	>180,000	0.0195″ (arm 1) 0.0236″ (arm 2) 0.0295″ (arm 3) [sampling along slit]	*5 slits* *Width* x *Length* 0.028″ or 0.041″ or 50″ (arm 1) 0.053″ or x 60″ (arm 2) 0.106″ or 75″ (arm 3) 0.214″	Slit length x 2′	0.5-10 sec per slit position (polarimetry) 0.02-0.2 sec per slit position (intensity-only)	SPINOR, Hinode/SP, IRIS, GRIS *Scanning spectrograph, high spectral fidelity*
Visible Tunable Filter ***VTF***	Fabry Perot Imaging Spectropolarimeter	520-870nm (sequential scans through multiple spectral lines)	FWHM 6-8 pm	0.014″	60″ x 60″	60″ x 60″	Typical scan times per spectral line: 0.5-2 s (intensity only); 2-10 s (polarimetry)	IBIS, CRISP, GFPI *Imaging spectropolarimeter*
Visible Broadband Imager ***VBI (Red)***	High Cadence, High Resolution Imager	600–860nm (sequential filter sequencing)	N/A	0.017″	69″ x 69″	2′ x 2′ (sequential field sampling)	3.2 sec (reconstructed) 0.03 sec (raw images)	ROSA, Hinode/BFI *High cadence, high spatial resolution*
Diffraction Limited Near Infrared Spectropolarimeter ***DL-NIRSP***	Integral Field Unit Spectropolarimeter	500–900nm 900–1350nm 1350-1800nm (1 filter band per channel)	125,000	0.03″ (high res) 0.077″ (mid res) 0.464″ (wide field)	2.4″ x 1.8″ (high res) 6.16″ x 4.62″ (mid res.) 27.84″ x 18.56″ (wide)	2′ x 2′	Depends on resolution and and total field of view. E.g. 6s for one tile, on-disk, high resolution, full polarimetry	SPIES *True Imaging Spectropolarimeter: simultaneous 2D FOV and spectral information using fiber-fed IFU*
Cryogenic Near Infrared Spectropolarimeter ***Cryo- NIRSP***	Scanning Slit Spectropolarimeter	1000-5000nm (1 filter band at a time. About 70 s to switch filters)	100,000 on-disk 30,000 off-limb	0.12″ [along slit] (no Adaptive Optics)	*2 slits* 0.15″ x 120″ slit 0.5″ x 240″ slit	4′ x 3′ (near limb) 5′ round (off-limb)	Heavily depends on signal to noise. Maximum frame rate is 10 frames per second e.g. 1s per slit position near-limb/ chromosphere	CYRA (BBSO) *Cryogenic, scanning spectrograph, novel diagnostics*
Cryo-NIRSP ***Context Imager***	Imager	1000-5000nm (1 filter band at a time, with fast switching time to support sequential observations during a single-band spectrograph scan.)	N/A	0.052″ (no Adaptive Optics)	100″ x 100″	4′ x 3′ (near limb) 5′ round (off-limb)	Heavily depends on signal to noise. Maximum frame rate is 10 frames per second e.g. 1s per slit position near-limb/ chromosphere	CYRA (BBSO) *Cryogenic, scanning spectrograph, novel diagnostics*

Facility Instrument Distribution Optics (FIDO):

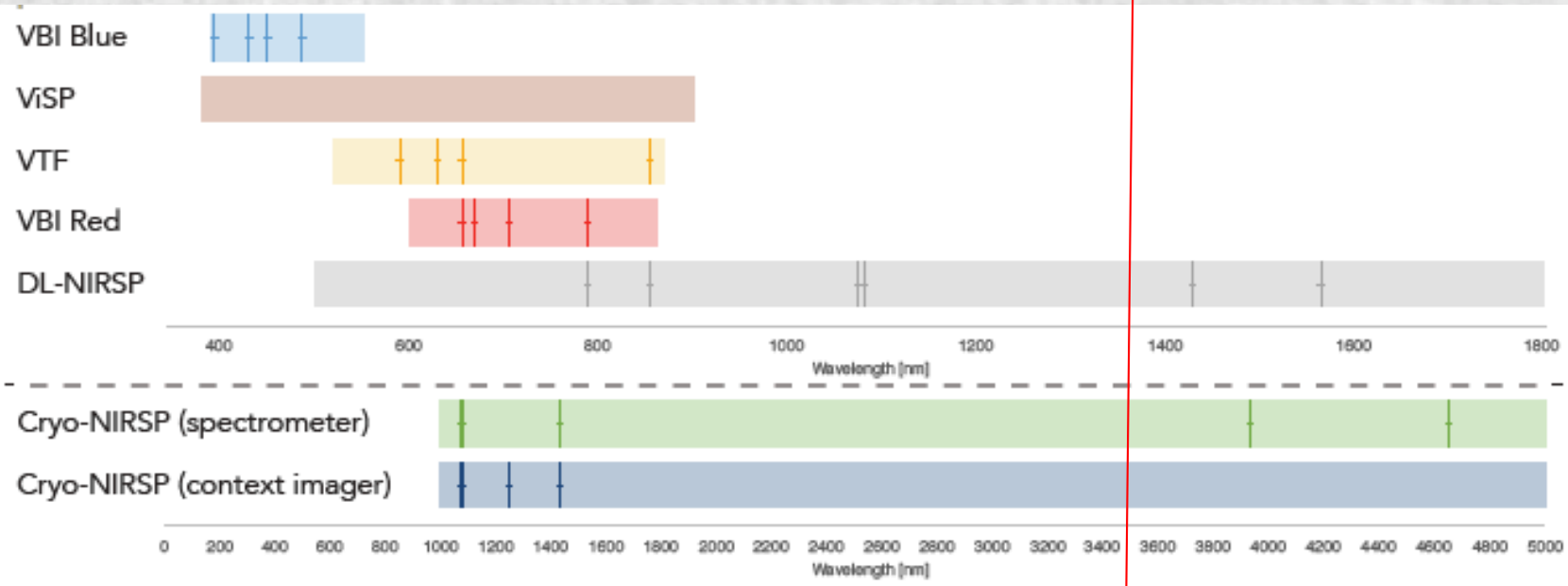
- FIDO diverts short and *passes long wavelengths* with each successive beamsplitter encounter (a few exceptions)
- Changing from one optical configuration to another is a manual process that requires up to one day to complete
- Cryo-NIRSP receives all the light, can not operate simultaneously with any of the other DKIST instrumentation or the adaptive optics system, can be accessed within several tens of minutes .



See Summary FIDO document and download:
http://dkist.nso.edu/CSP/instruments

DKIST Instrument Summary Table

http://dkist.nso.edu/CSP/instruments



VBI Blue		ViSP	VTF		VBI Red		DL-NIRSP		Cryo-NIRSP		Cryo Context	
Ca II K	393.327nm	Access to entire spectral range between 380-900 nm	Na D	589.6nm	H-alpha	656.282nm	Fe XI	789nm	Fe XIII	1074.7nm	Fe XIII	1074.7nm
G-band	430.52nm		Fe I	630.25nm	Continuum	668.423nm	Ca II	854.2nm	Fe XIII	1079.7nm	He I	1083nm
Continuum	450.287nm		H-alpha	656.3nm	TiO	705.839nm	Fe XIII	1074.7nm	He I	1083 nm	J Band	1250nm
H-beta	486.1nm		Ca II	854.2nm	Fe XI	789.186nm	He I	1083nm	Si X	1430nm	Si IX	1430nm
							Si X	1430nm	Si IX	3935 nm		
							Fe I	1565nm	CO	4651nm		

This table is meant to give an idea of the capabilities of the DKIST first light instrument suite. It cannot capture the large trade space that is provided by the flexibility of the instruments. For more information, visit http://dkist.nso.edu/CSP/instruments

Visible light cameras for instruments are provided by a UK consortium.

NSO KIS HAO AURA

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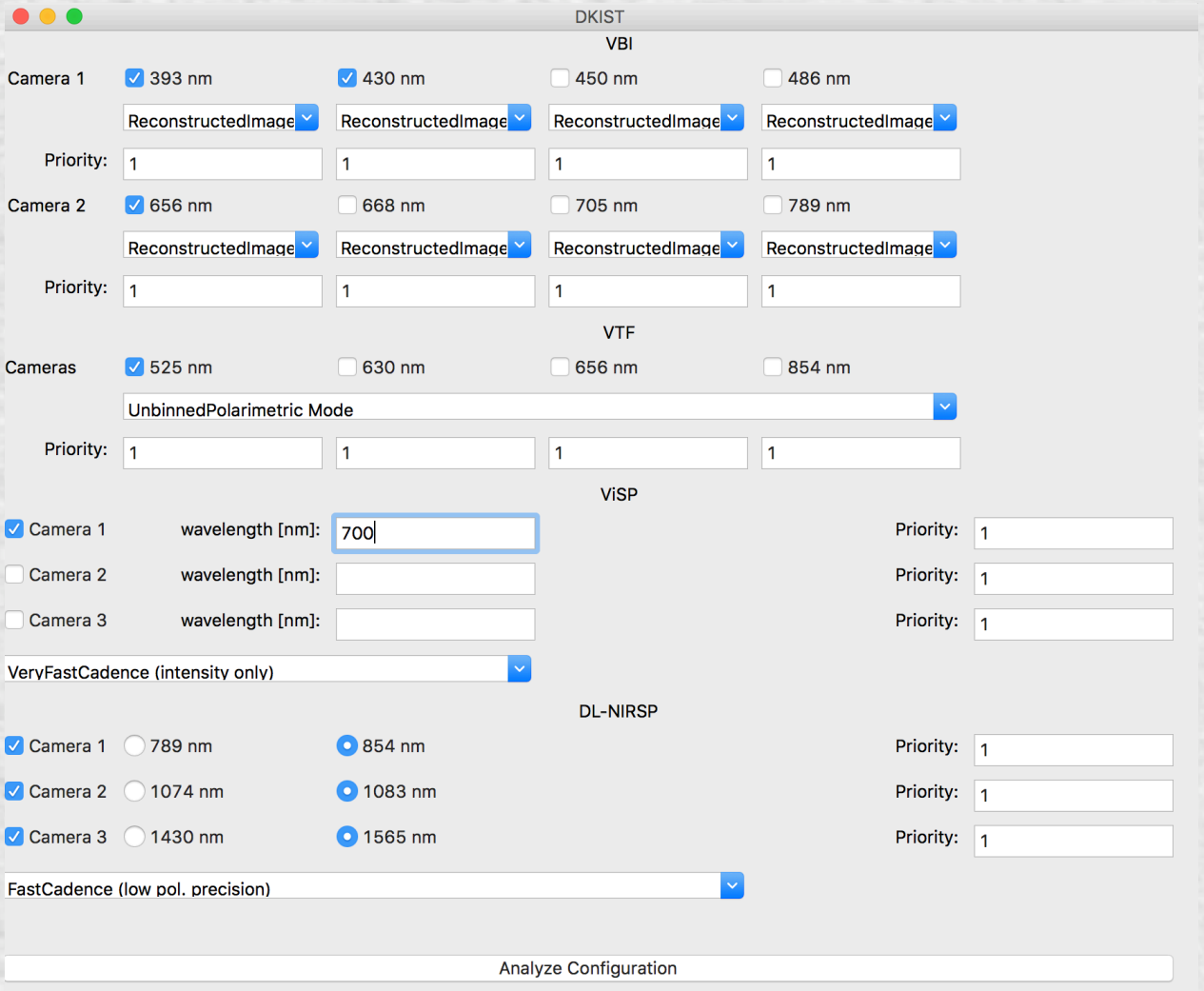
Ver: 1.6 12/20/2017

Check your selection using the Beam Splitter (FIDO)and Data-rate Analysis Tool

INPUTS:
Wavelengths and modes for each desired instrument

Priorities can also be used for optimization (instrument selection)



Output to be included under INSTRUMENT SPECIFICS tab on JIRA form

Instrument Performance Calculators (IPCs)

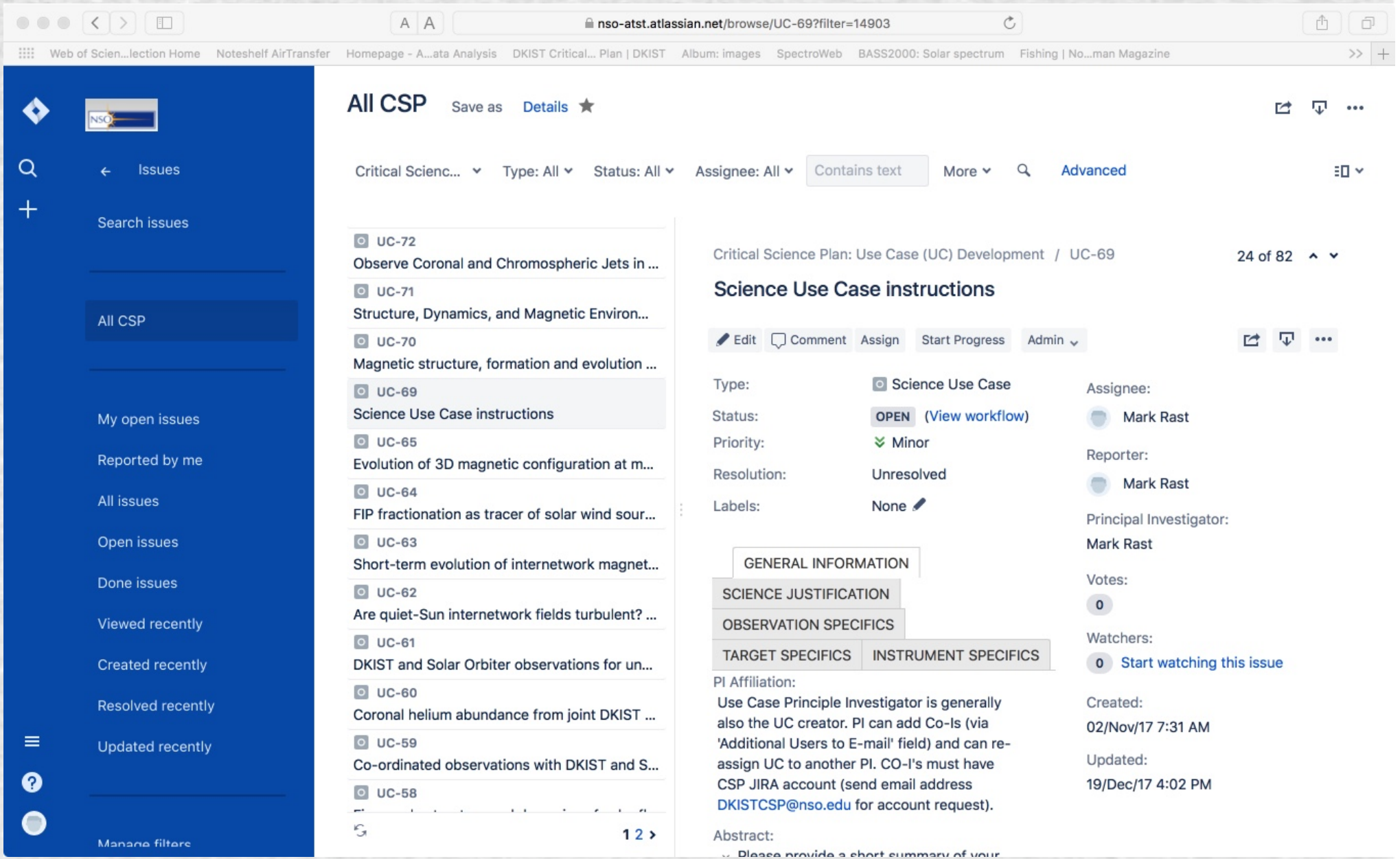
- Set of tools (i.e. software programs/applications) to explore instrument capabilities – e.g. line selection, exposure times, SNR etc.
- A *separate* IPC needs to be run for each instrument. VBI and VTF are Java applications (1.9); ViSP and DL-NIRSP run in IDL (8+). (The Cryo-NIRSP IPC unfortunately is not yet ready for distribution)

Instrument Performance Calculators:
http://dkist.nso.edu/CSP/instruments

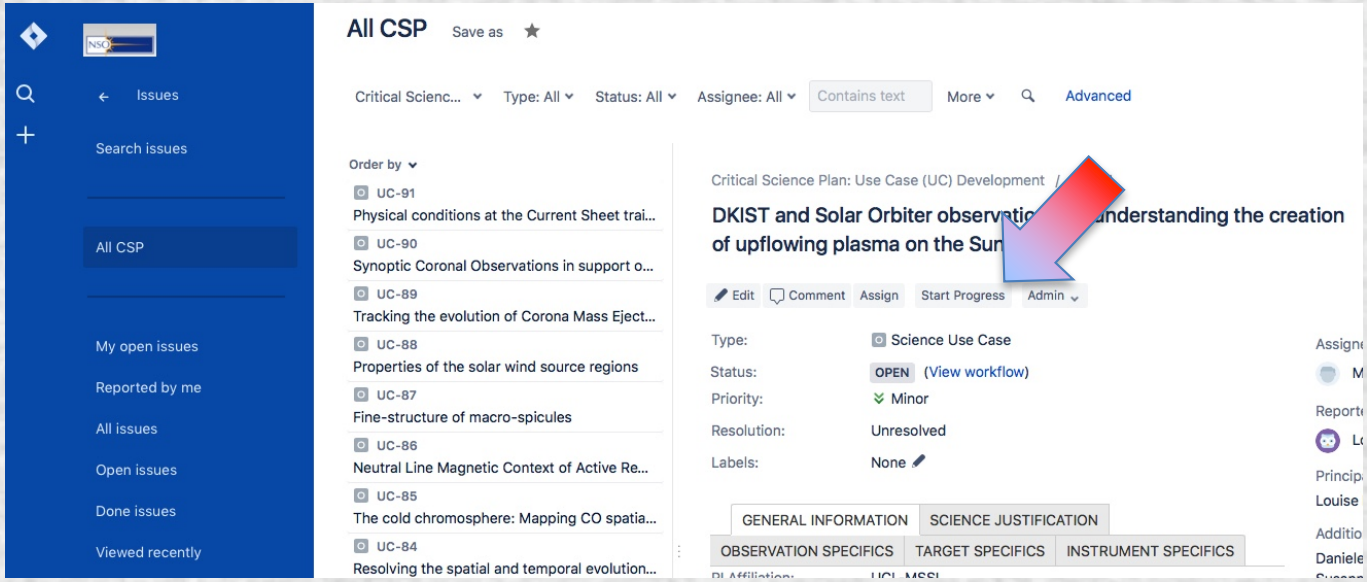
Output can be attached to JIRA form for sharing with team and for possible future Science Use Case development.

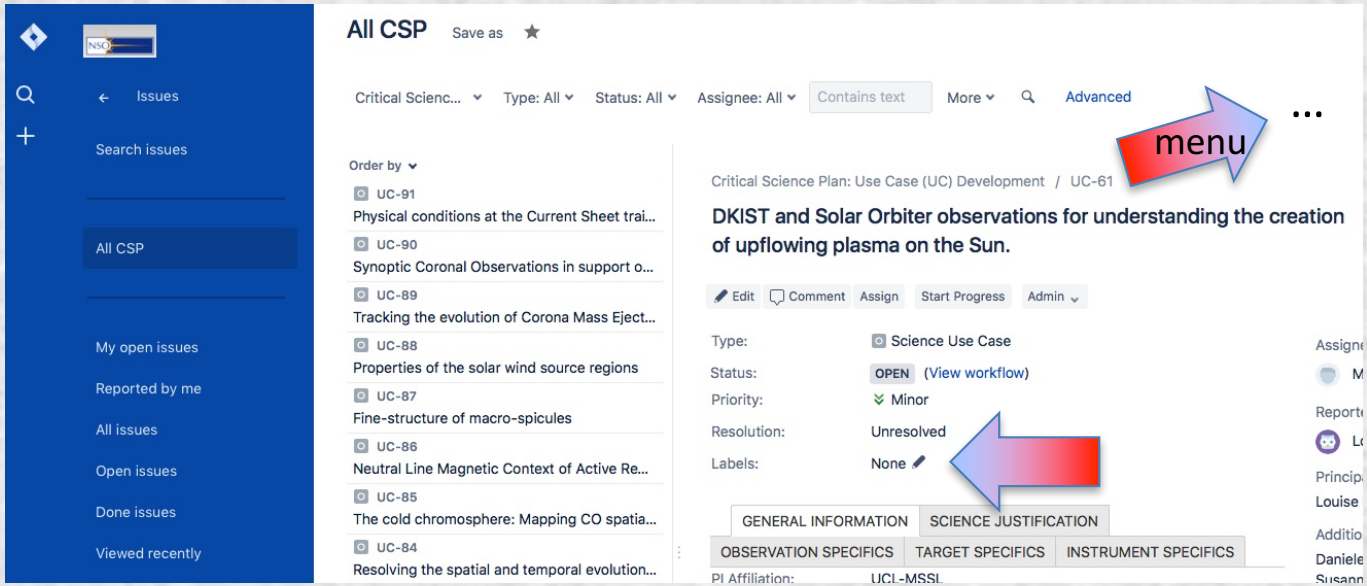
BUT relevant content of IPS must be entered into Science Use Case as well.

http://nso-atst.atlassian.net/ Instructions: UC-69



DKIST CSP: JIRA User's Guide
Status and *Labels* Fields





- For now please do not select *Start Progress* (which changes the *Status* field)

- If you worked on your Science Use Case as part of a DKIST CSP Workshop, please edit *Labels* as:
  - CSPW-SPD2016
  - CSPW-Huntsville
  - CSPW-DC
  - CSPW-Freiburg
  - CSPW-Nagoya
  - CSPW-JHU/APL
  - **CSPW-Newcastle**
  - CSPW-NMSU
  - CSPW-Rice
  - CSPW-Bozeman
  - CSPW-Synoptic

  as appropriate.

http://dkist.nso.edu/CSP

- Critical science description (living document) with links to Science Use Case titles and abstracts, and ultimately their full text
- Links to Instrument and other summary documents
- Links to beam-splitter configuration and data rate analysis tool (FIDO)

NOTE: LINKS to ALL documents and tools at MASTER LINK: https://dkist.nso.edu/CSP/instruments. Everything can be found through this one link.

http://nso-atst.atlassian.net/

Collaborative JIRA environment for Science Use Case development, and ultimately Observing Proposal development

https://www.dropbox.com/sh/uzwdc03ayovxr5o/AABuZbWtCnfPqG8F2zHaeCFta?dl=0

Dropbox link with summary documents (Instruments, Data Handling System (DHS), Facility Instrument Distribution Optics (FIDO), JIRA User's guide), and Instrument Performance Calculators (IPCs)