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On-line Access and Visualization of Multi- dimensional FITS Data

Pavol Federl

Institute for Space Imaging Science
University of Calgary



Overview

- CyberSKA project
 - Develop cyberinfrastructure for SKA
 - Online accessible tools
 - HW/SW requirements: computer + modern browser
 - Cyber SKA web portal
www.cyberska.org
-



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www.cyberska.org

CyberSKA

Home Profile Settings myDashboard myGroups Tools About Help Administration

Artists impression of the core of the Square Kilometre Array (SKA). Image courtesy of SPDO / Swinburne Astronomy Productions

Expanded Very Large Array (EVLA), New Mexico. Image courtesy of NRAO/AUI.

Arecibo Observatory, Puerto Rico. Image courtesy of the NAIC - Arecibo Observatory, a facility of the NSF.

The Square Kilometre Array (SKA) is a global project to construct a next generation international radio telescope. The SKA will consist of an array of radio antennas to detect electromagnetic radiation at wavelengths from meters to centimetres, with a total collecting area of order a million square meters (one square kilometre), making it 50 times more sensitive and 10,000 times faster for imaging the sky than our most powerful existing radio telescope arrays.

The imaging power of the SKA will create massive data sets that contain within them information about the origin, structure and evolution of our Universe. Processing and mining these data sets will require coordinated effort among globally distributed research institutions. Radio astronomy observing programs that foreshadow the scale and power of the SKA are currently under way with the world's most powerful instruments. The Arecibo L-band Feed array system has enable large-scale imaging and pulsar surveys with the world's largest radio astronomy collecting area, and the Expanded Very Large Array (EVLA) including the new Canadian-built WIDAR correlator system has greatly increased the imaging power of the world's most powerful radio array. These new capacities create opportunities for new science that is underpinned by massive data flows and volumes.

This portal is being developed as a multi-institution partnership to create cyberinfrastructure for collaborative execution of large, data-intensive science programs in radio astronomy on the pathway to the Square Kilometre Array. Canadian funding for the CyberSKA project is provided as part of the CANARIE Network Enabled Platforms (NEP-2) program.

News

Release news for latest CyberSKA portal update to v1.0.3 on November 4th, 2010 - <http://bit.ly/a9Mv3X>
about 3 hours ago

Slides from CyberSKA Presentation at PrepSKA WP2 meeting in Oxford, UK on October 29, 2010 - <http://bit.ly/clGvuy>

Events

CyberSKA Imaging Science Technical Meeting
Weekly Imaging Science technical team meeting
13:00 - 14:00, 2 Nov 2010

ADASS 2010
Astronomical Data Analysis Software and

More Information

CyberSKA:
Overview and Progress

Radio Telescopes:
Arecibo
ASKAP
EVLA
GAMMA

UofC_Graphic_Standar...pdf UofC_Graphic_Standar...pdf UofC_Graphic_Standar...pdf Presentation_white.ppt Show all downloads...



www.cyberska.org

- Data access tool
 - Interactive tool for selecting reduced set for download
 - Rectangular region, spectral frequency, stokes, ...
- FITS viewer
 - User uploaded content
 - Interactive zoom, pan, coordinate systems, region statistics, histogram and colormap correction, coordinate grid overlay



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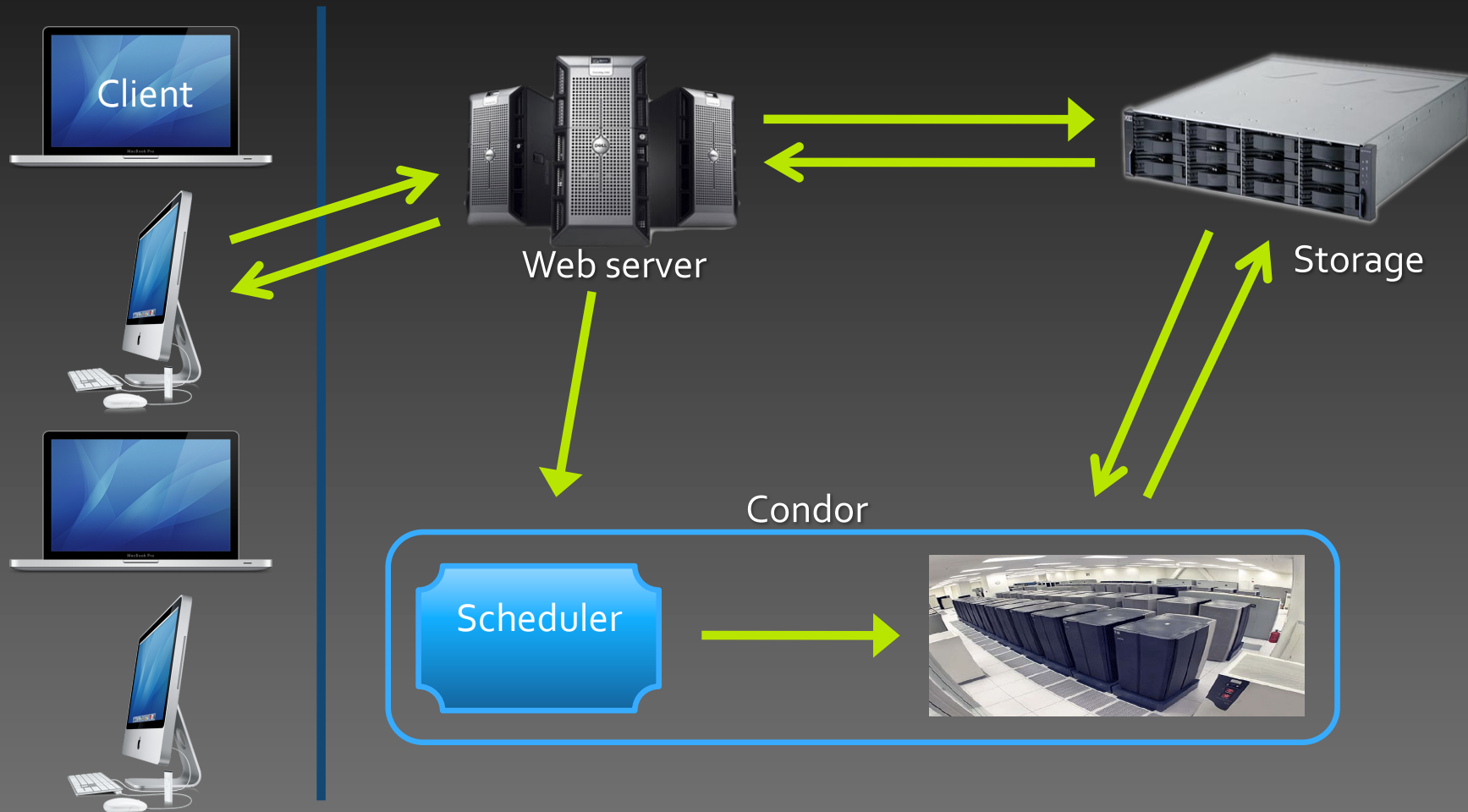
Demo



Implementation Details

- Client side
 - HTML 5
 - JavaScript
 - Ajax
 - Server side
 - PHP
 - Condor Pool
 - C++
 - NFS
-

Implementation Details





Implementation Details

- FITS files are parsed on the server
 - One frame at a time is sent to client
 - Parsed information is cached
-



Limitations & Future Work

- FITS file size
 - Browser support (no IE)
 - JavaScript performance
-



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Thank you.



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Thank you.



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Thank you.

Data access tool

- Interactive tool for selecting reduced set for download
 - Rectangular region, spectral frequency, stokes, ...



GALFACTS Run 1

.. X .. X ..
Not available yet



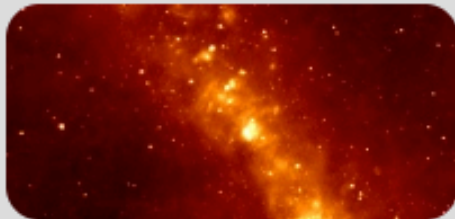
IGALFA A Field

.. X .. X ..
Not available yet



IGALFA B Field

.. X .. X ..
Not available yet



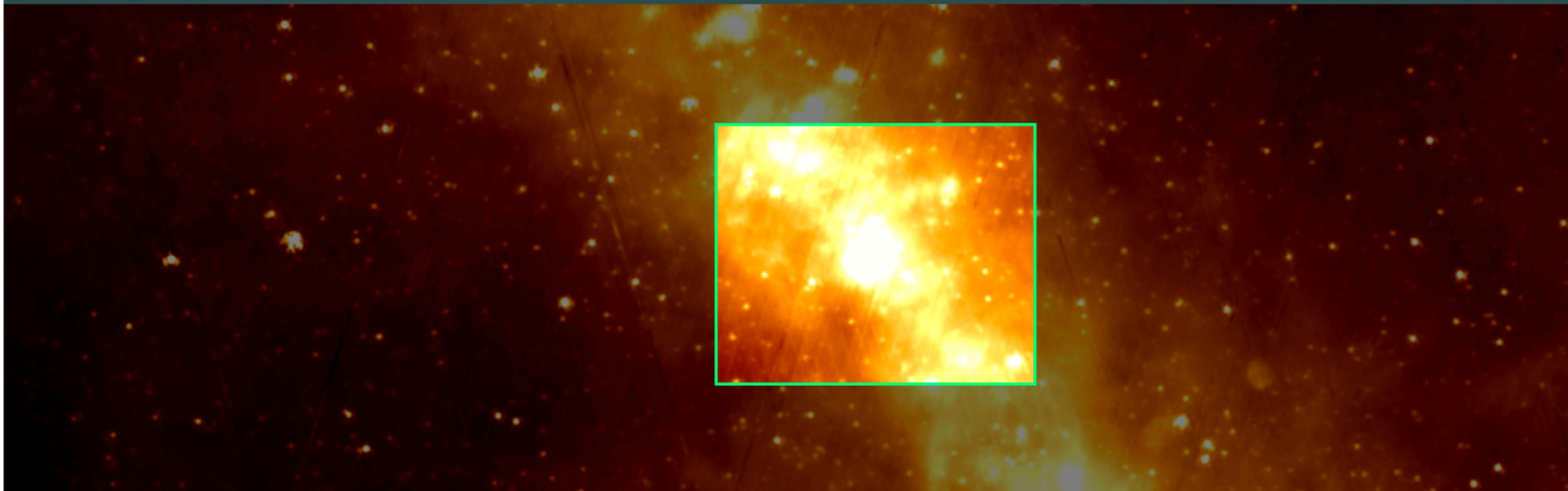
IGALFA C Field

2101 x 541 x 3500
Cubes available: IQUVW



IGALFA D Field

2700 x 541 x 50
Not available yet



Cursor: 918.68, 207.39 α :19:58:49.247 δ :23:05:23.842

Display cube: **I** Q U V W

Bottom left

x:

y:

α :

δ :

Center

x:

y:

α :

δ :

Top right

x:

y:

α :

δ :

Archive

tar

tgz

zip

Cubes

I Q

U V

W

Download information

Estimated download size
(uncompressed):

74.50 MB

Cubes: 1
262 x 213 x 350 (3500/10)

Frequency range

Start channel #: freq: MHz

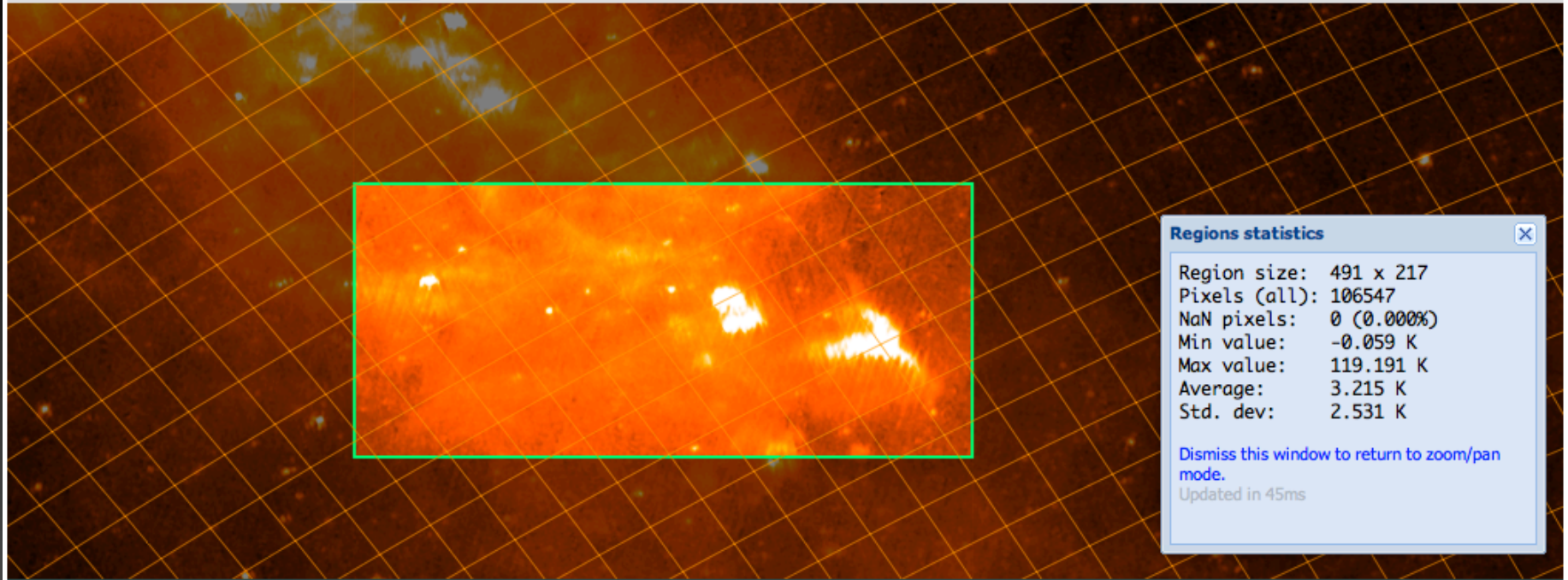
End channel #: freq: MHz

Spectral averaging

Averaging width Δn : Δf : MHz

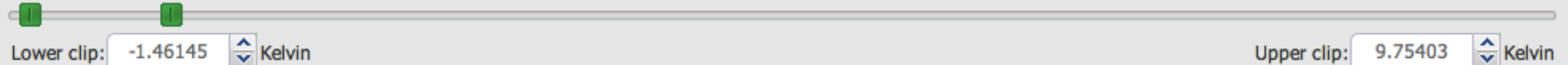
All jobs

| Description | Dimension | Cubes | Channel width | Total bandwidth | ID | Owner | Submitted | Size | Status |
|------------------|--------------|-----------|---------------|-----------------|------------|------------|------------------------|----------|--------------------------|
| galfacts-c-field | 345x265x3500 | I U W Q V | 42.0 kHz | 147.0MHz | 1491452695 | russ | Jul 13, 2010, 7:56 pm | 6.0 GB | Download |
| galfacts-c-field | 2101x541x1 | I | 147.0MHz | 147.0MHz | 487666868 | sguram | Jul 13, 2010, 8:40 pm | 4.3 MB | Download |
| galfacts-c-field | 2101x541x1 | I U W Q V | 126.0MHz | 126.0MHz | 1823532942 | sguram | Jul 13, 2010, 8:49 pm | 21.7 MB | Download |
| galfacts-c-field | 2101x541x70 | I U W Q V | 2.1MHz | 147.0MHz | 780424809 | bgaensler | Jul 14, 2010, 12:30 am | 1.3 GB | Download |
| galfacts-c-field | 210x179x350 | I U Q | 420.0 kHz | 147.0MHz | 2082031260 | farnsworth | Jul 15, 2010, 12:43 am | 150.6 MB | Download |
| galfacts-c-field | 305x184x3500 | I | 42.0 kHz | 147.0MHz | 41197292 | samuel | Jul 15, 2010, 1:28 pm | 749.3 MB | Download |
| galfacts-c-field | 2101x541x221 | I U Q V | 546.0 kHz | 120.7MHz | 890482880 | russ | Jul 19, 2010, 1:35 pm | 3.7 GB | Download |
| galfacts-c-field | 2101x541x10 | U W Q | 420.0 kHz | 4.2MHz | 1959837250 | PaddyLeahy | Jul 26, 2010, 1:18 pm | 116.4 MB | Download |
| galfacts-c-field | 2101x541x35 | U W Q | 4.2MHz | 147.0MHz | 1772671462 | PaddyLeahy | Jul 26, 2010, 1:33 pm | 408.6 MB | Download |
| galfacts-c-field | 1x478x350 | I | 420.0 kHz | 147.0MHz | 1863506377 | rosolowsky | Aug 12, 2010, 4:24 pm | 660.0 kB | Download |
| galfacts-c-field | 2101x541x70 | I U Q | 2.1MHz | 147.0MHz | 260950481 | rkothes | Aug 18, 2010, 7:29 pm | 0.8 GB | Download |
| galfacts-c-field | 2101x541x107 | U Q | 42.0 kHz | 4.5MHz | 988828432 | rkothes | Aug 19, 2010, 1:11 pm | 0.8 GB | Download |
| galfacts-c-field | 2101x541x85 | I U Q | 42.0 kHz | 3.6MHz | 1889900553 | rkothes | Aug 19, 2010, 1:41 pm | 1.1 GB | Download |
| galfacts-c-field | 2101x541x9 | I U W Q V | 15.0MHz | 135.3MHz | 1807888583 | pfederl | Aug 23, 2010, 4:42 pm | 195.1 MB | Download |
| galfacts-c-field | 144x140x3 | I U W Q V | 18.1MHz | 54.3MHz | 1157872197 | samuel | Sep 1, 2010, 1:15 pm | 1.0 MB | Download |
| galfacts-c-field | 158x85x350 | I | 420.0 kHz | 147.0MHz | 1133620303 | arne | Sep 27, 2010, 11:37 am | 16.0 MB | Download |
| galfacts-c-field | 209x173x350 | I | 420.0 kHz | 147.0MHz | 344714107 | arne | Sep 28, 2010, 11:53 am | 48.3 MB | Download |
| galfacts-c-field | 348x199x175 | I | 840.0 kHz | 147.0MHz | 1243921045 | samuel | Oct 1, 2010, 5:45 pm | 46.2 MB | Download |
| galfacts-c-field | 267x179x350 | I | 420.0 kHz | 147.0MHz | 567714920 | russ | Oct 19, 2010, 11:31 am | 63.8 MB | Download |
| galfacts-c-field | 2101x541x35 | I | 4.2MHz | 147.0MHz | 1875271553 | fostert | Oct 19, 2010, 10:30 pm | 140.0 MB | Download |
| galfacts-c-field | 136x95x350 | I | 420.0 kHz | 147.0MHz | 870532971 | admin | Oct 21, 2010, 11:20 am | 17.3 MB | Download |
| galfacts-c-field | 314x235x350 | I | 420.0 kHz | 147.0MHz | 1387583837 | admin | Oct 21, 2010, 12:37 pm | 98.5 MB | Download |



Cursor: 1722 , 527 J2000 α : 19:45:13.997 δ : 37:25:00.030 Frequency: 1.3724188280999998 kHz
Value: -0.062 K Gala. l: 71:54:29.189 b: 6:28:07.034

Histogram



Histogram presets

95% 98% 99% 99.5% 99.9 99.99 Full range

Colormaps

Spring Heat Gray Brightness: [slider]