

Mining Big Data spectral archives using SSA+DataLink in SPLAT-VO

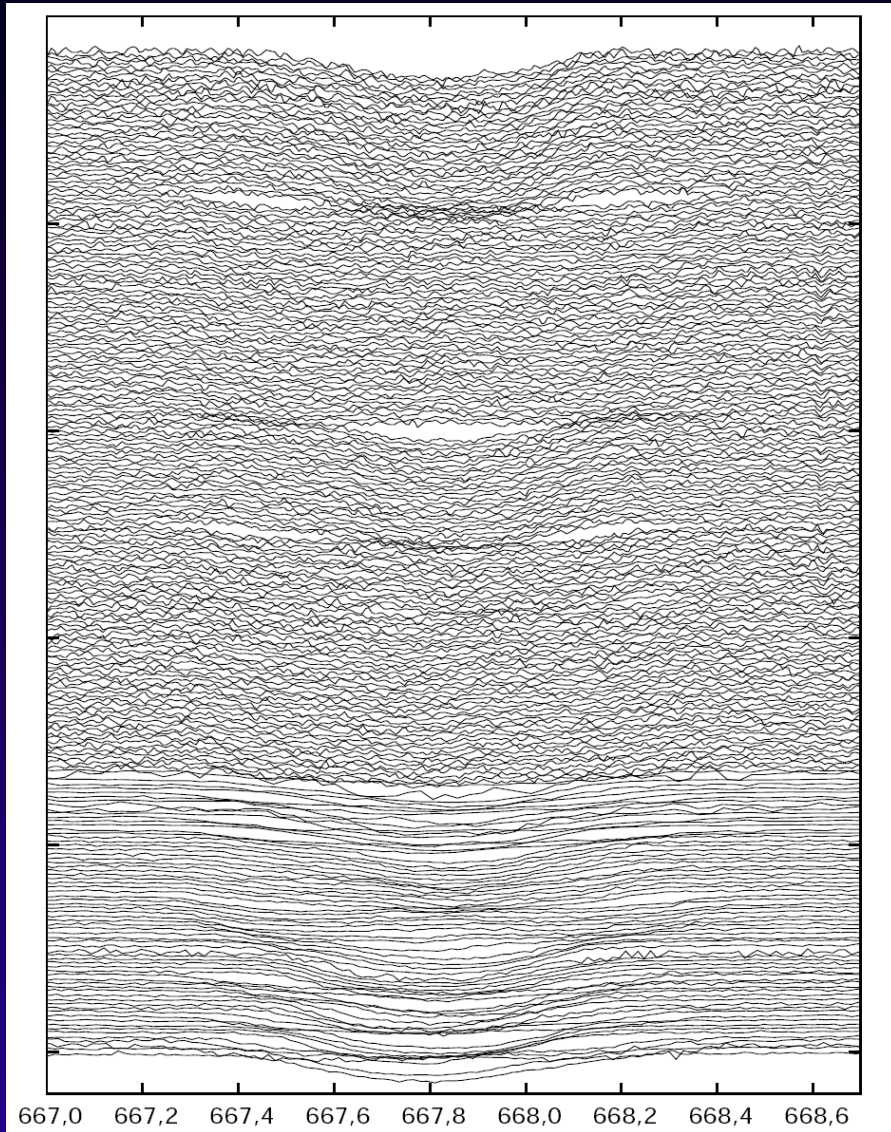
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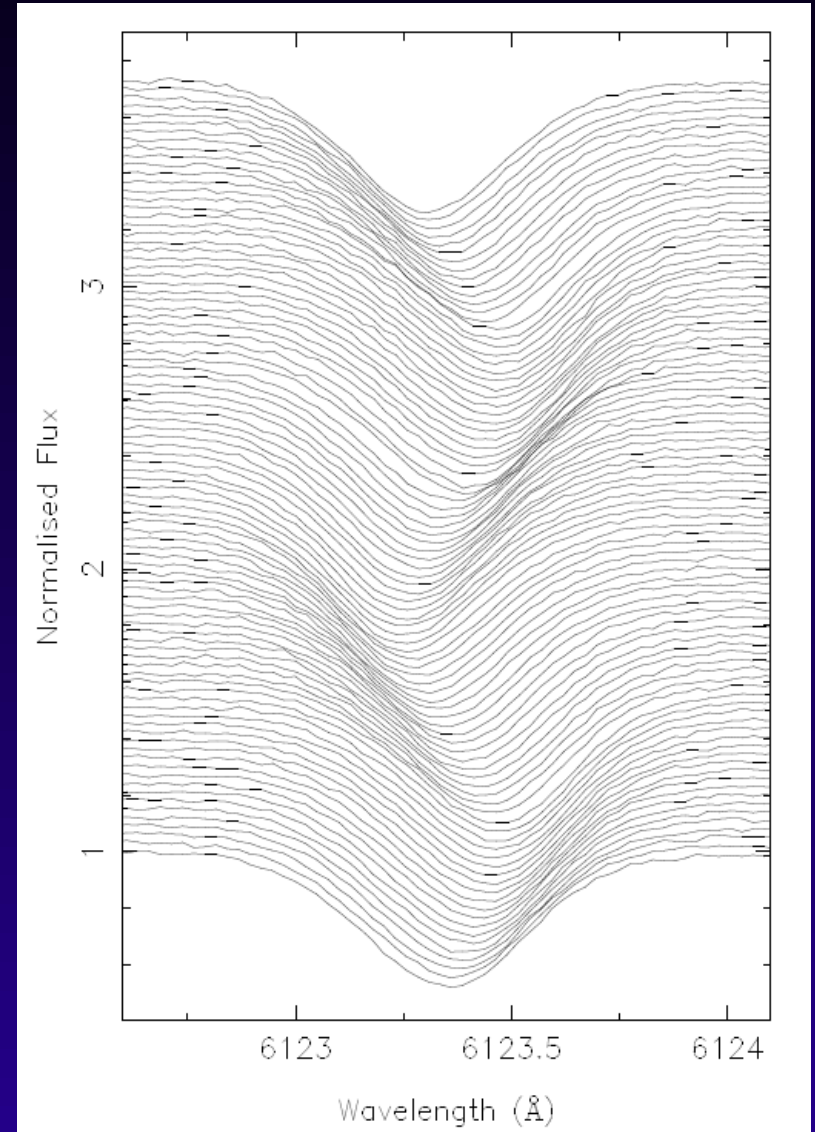
Supported by grant GACR 13-08195S

IVOA Interoperability workshop, Applications I session,
ESAC, Villafranca del Castillo, Spain, 22th May 2014

Motivation - LPV

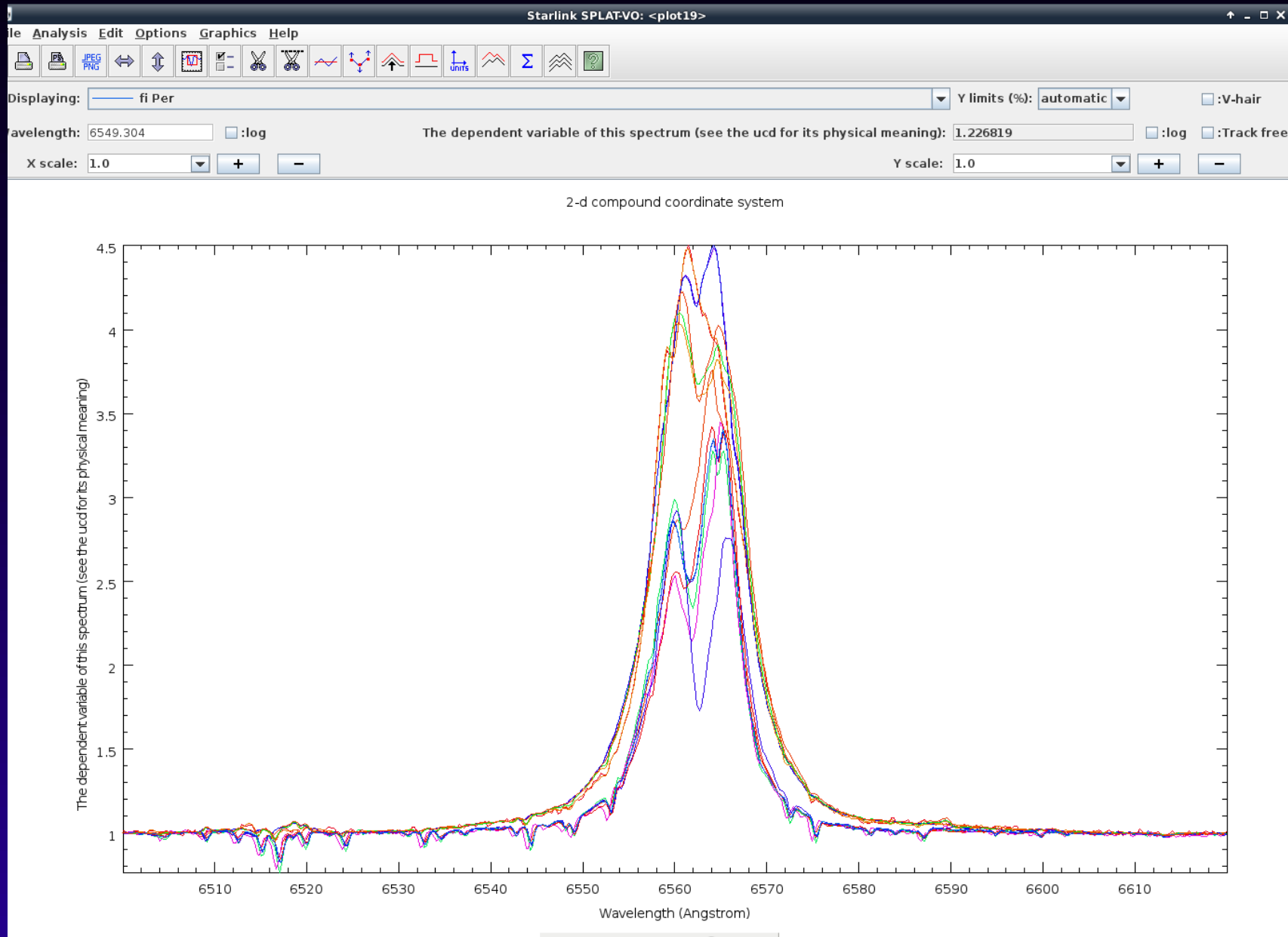


V436 Per Janík 2003



Rho Pup, Aerts et al.

Variability of Line Profile on Be star



Spectra Postprocessing Service

- Normalization - rectification (FT, Crosscor, RV, LPV)
- Cutouts
 - Data volume, several lines – short ranges
- Future development
 - Rebinning
 - Instrument profile convolution
 - Broadening functions (rotation, limb dark) for TSAP
 - RV/z shift
 - Combining different spectra – resolution power
Using SPECRP

Ondřejov Spectra Cutout and Normalization Service

- Science case since 2007 – Spectroscopy&VO
- 2008 – Baltimore (EURO-VO DCA support)
 - HEROS – 1000s p, normalized – NORMxx
 - Pleinpot – P. Prugniel (HyperLEDA, ELODIE)
 - Overloading BAND, FLUXCALIB
 - 2 services per survey – ssa ssac
- 2012 – Champaign/Urbana
 - DaCHS/Peterka – Bachelor thesis
 - HEROS – normalized files separate
 - CCD700 12000 sp– on the fly normalization !
 - Still overloading - 2x2 services

Ondřejov Spectra Cutout and normalization Service

- pssa core – postprocess

<http://ssaproxy.asu.cas.cz/ccd700/q/ssa/ssap.xml>

<http://ssaproxy.asu.cas.cz/ccd700/q/pssa/ssap.xml>

– Overloading FLUXCALIB

- Call special FORTRAN code - NORMALIZED
- Call simple rescaling by median – RELATIVE

– Overloading BAND

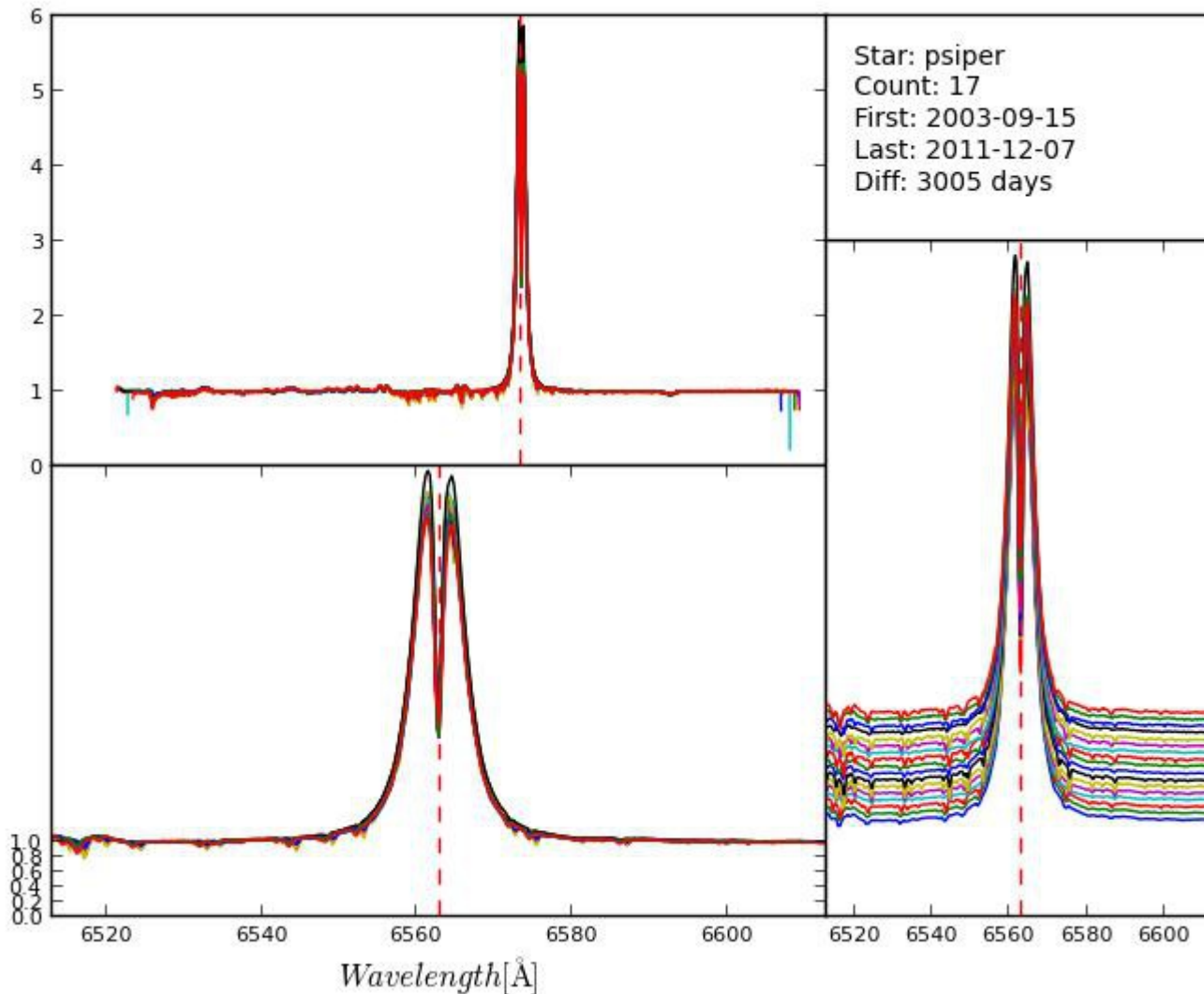
<http://ssaproxy.asu.cas.cz/getproduct/ccd700/data/4her/6255-6767/mh050025.fits?BAND=6540e-10%2F6580e-10&FLUXCALIB=normalized>

- getData (2013) – only note in SSAP1.x
- DataLink (2014) – full post-processing

Pros and Cons of current DaCHS DataLink

- Two step process – lost query params in accref
- Separated query and process params
 - Errors – cut region does not exist !
 - pssa used BAND to query AND cut
 - The same issue on datacubes
 - Filter in client or repeat query ?? (BigData)
 - DL needed to access normalized spectrum even if it exists x query by FLUXCALIB
 - In all cases – FORMAT conversion needed
 - Original file in 1D image – CRVAL, CDELTA
 - LAMOST, SDSS in rebinned log lamda !
 - Should be transparent – before cutout ?
 - Concept of NATIVE

Ond2m Archive - Stable Emission



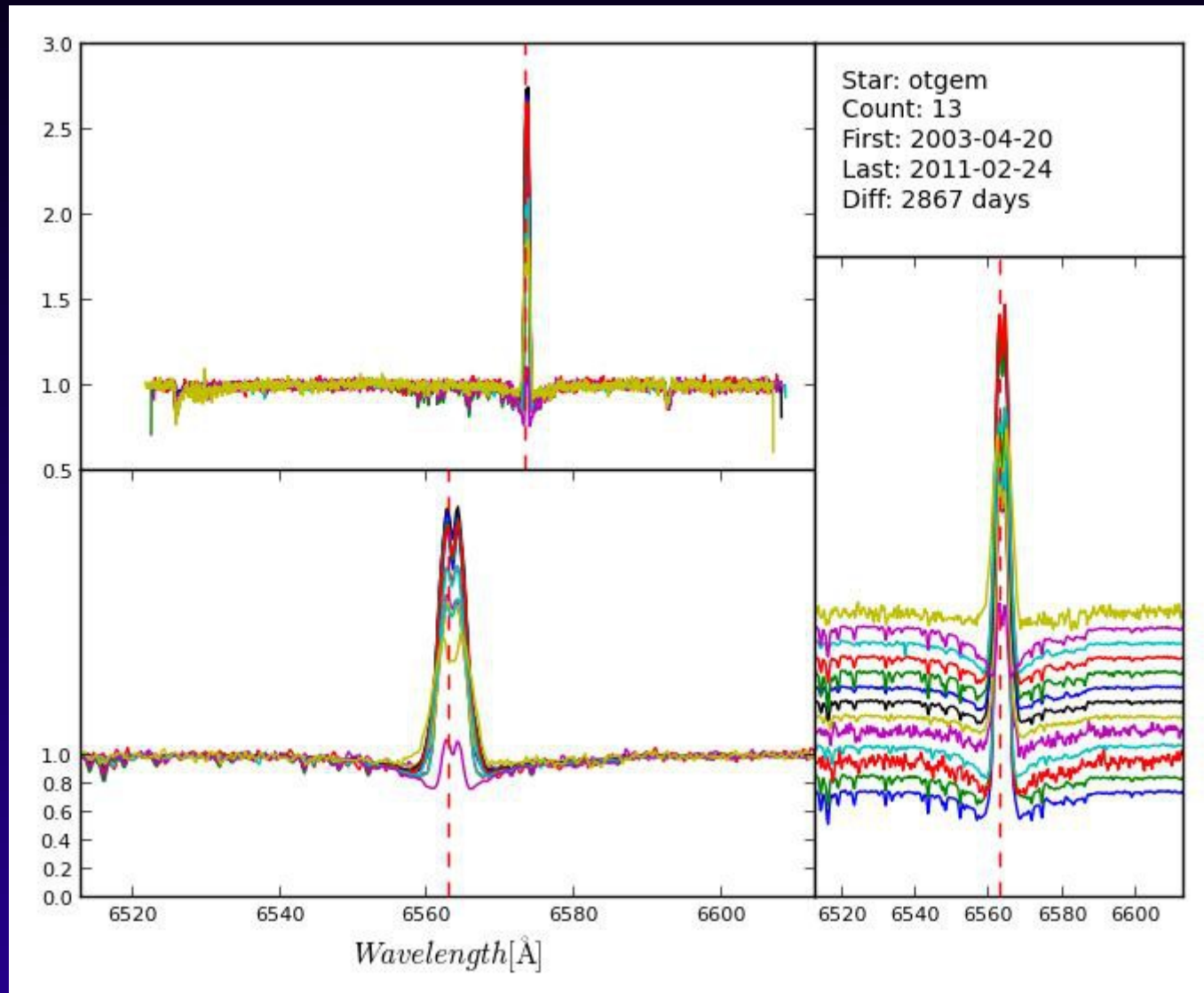
Automatic normalization,
cutouts on SSAP server,

SAMP to SPLAT-VO
analysis

12000 spectra of >1000
stars

Stable samples needed
for DM

Ond2m Archive - Unstable Emission



SDSS Spectra Survey - DR10

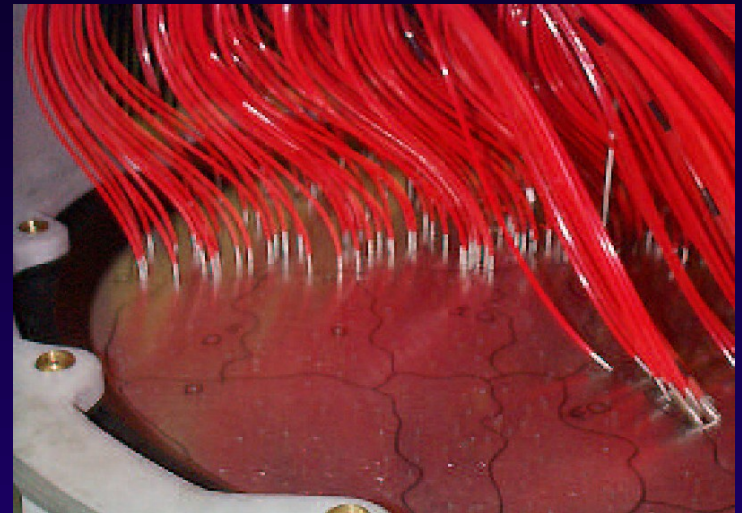
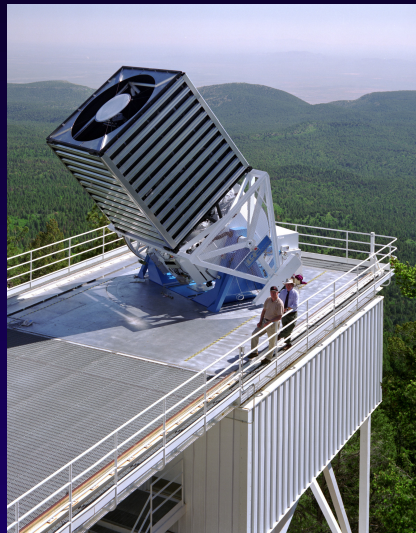
3,3 mil spectra (684 000 BOSS)

1 848 851 galaxy

308 377 quasar

736 484 stellar

57 454 stellar IR

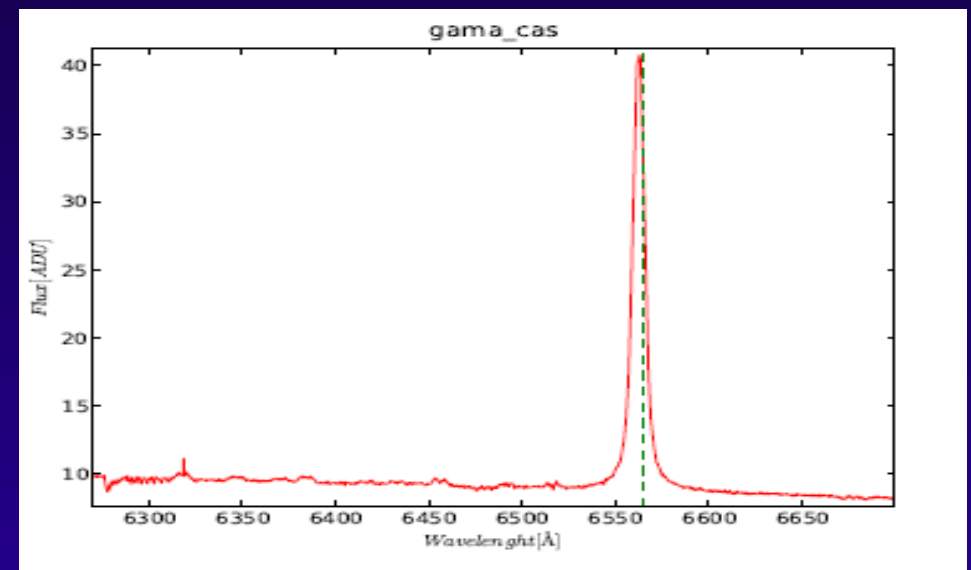
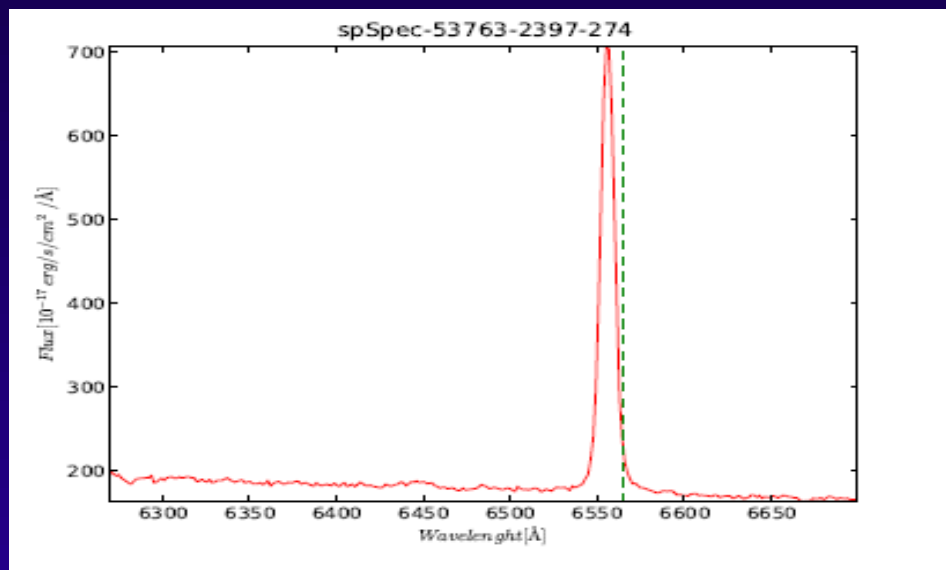
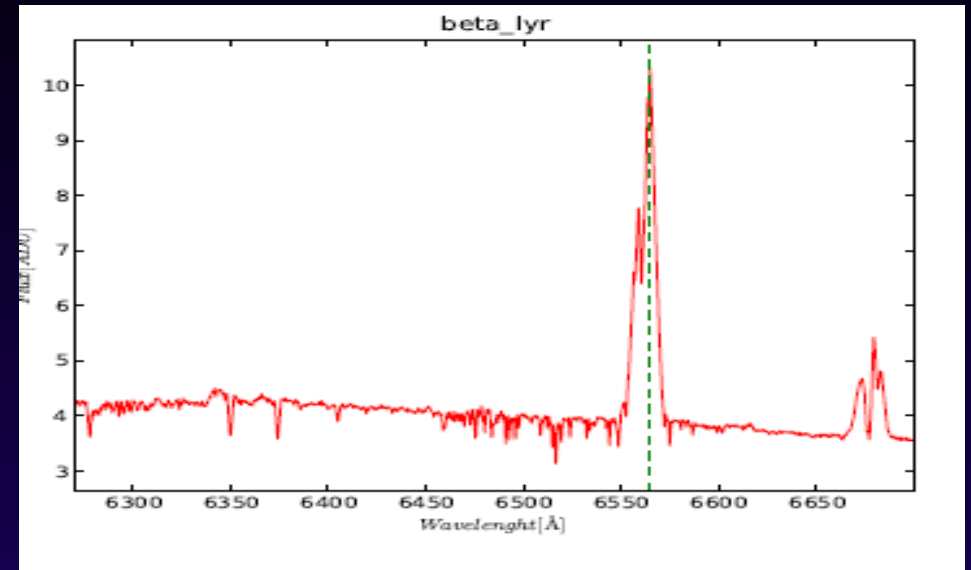
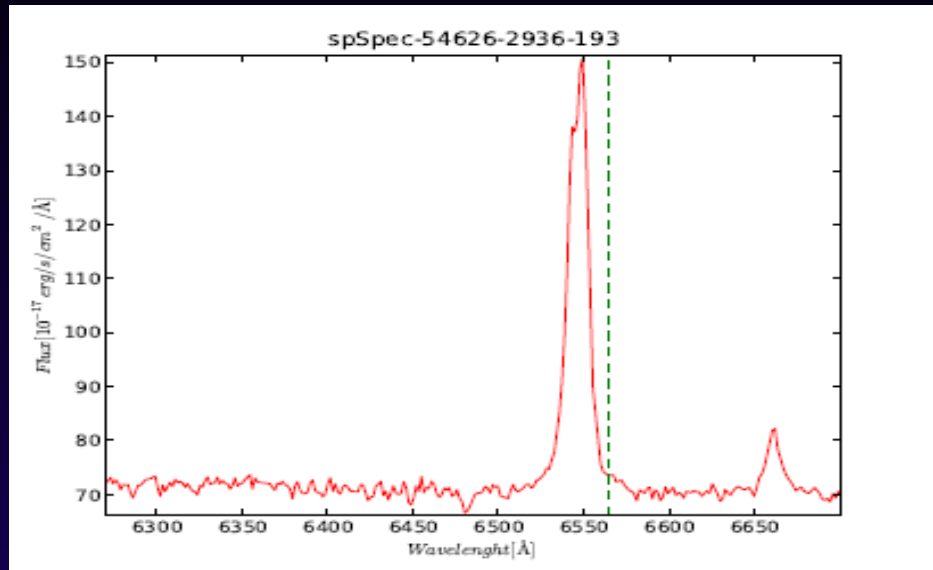


2 spectrograph SDSS-I 3800-9200 A R 1800-2200 640 fibers

BOSS 3600-10400 A R 1500-2600 1000 fibers

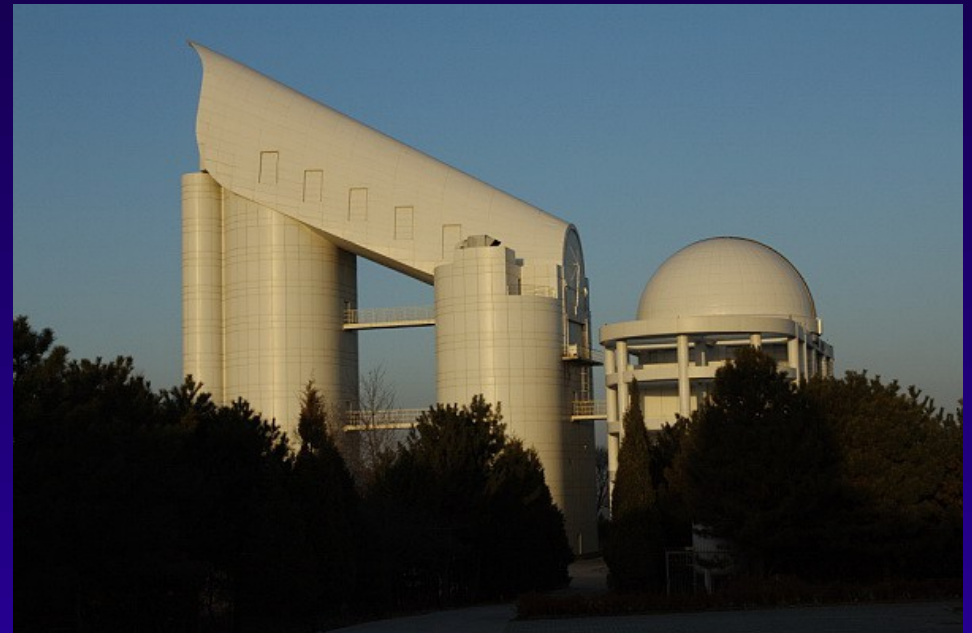
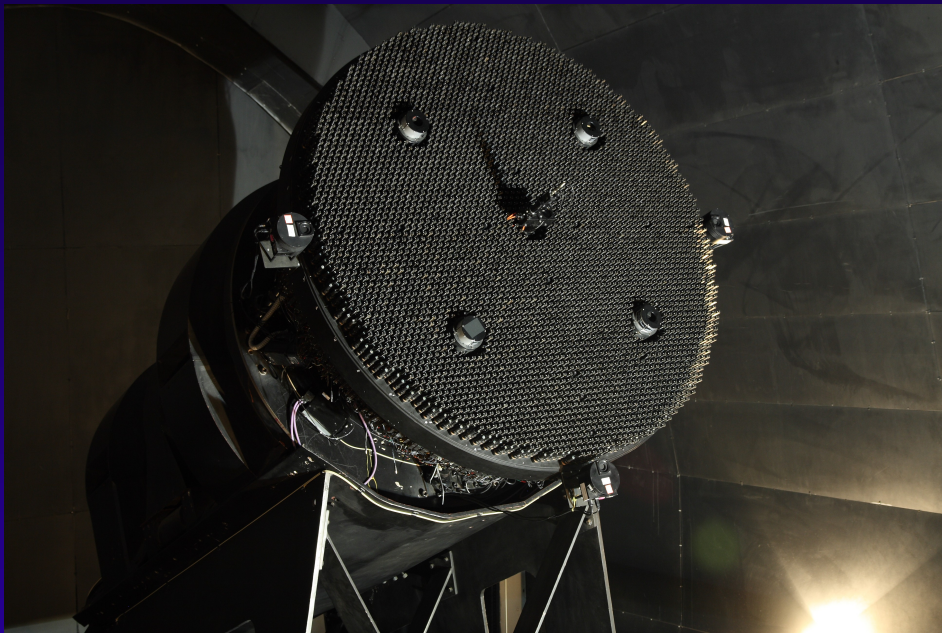
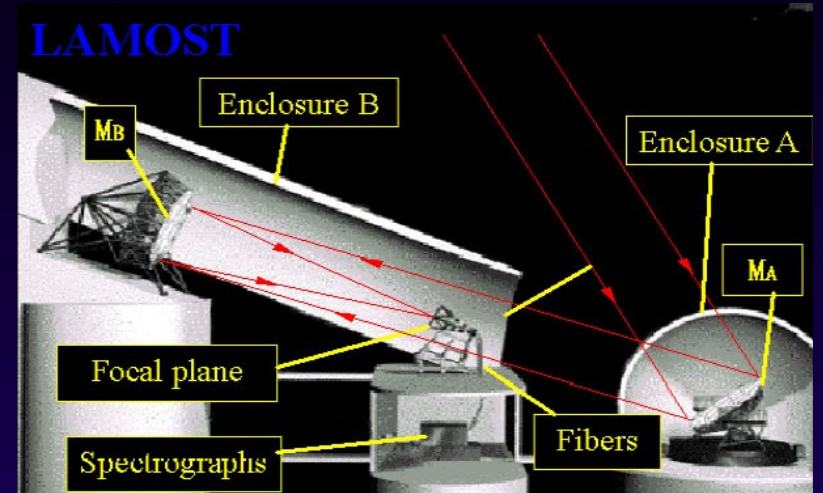
+ NIR APOGEE 1.51-1.70 um, R 22500 300 fibers

Candidates - Similarity !



LAMOST (Guoshoujing)

Xinglong- China
4m mirror (30 deg meridian)
4000 fibers
10 mil spectra / 5 yr
Automatic RV-z



LAMOST Spectral Surveys

PILOT survey (PDR) Oct 2011-Jun 2012 1.1 mil spectra

Regular survey Sep 2012-Jun 2013 1 487 200 spectra

DR1 (end 2013)

2 204 860 spectra including 717660 PDR

1 085 404 stars with estimated physical parameters

LEGAS extragalactic

LEGUE - galactic

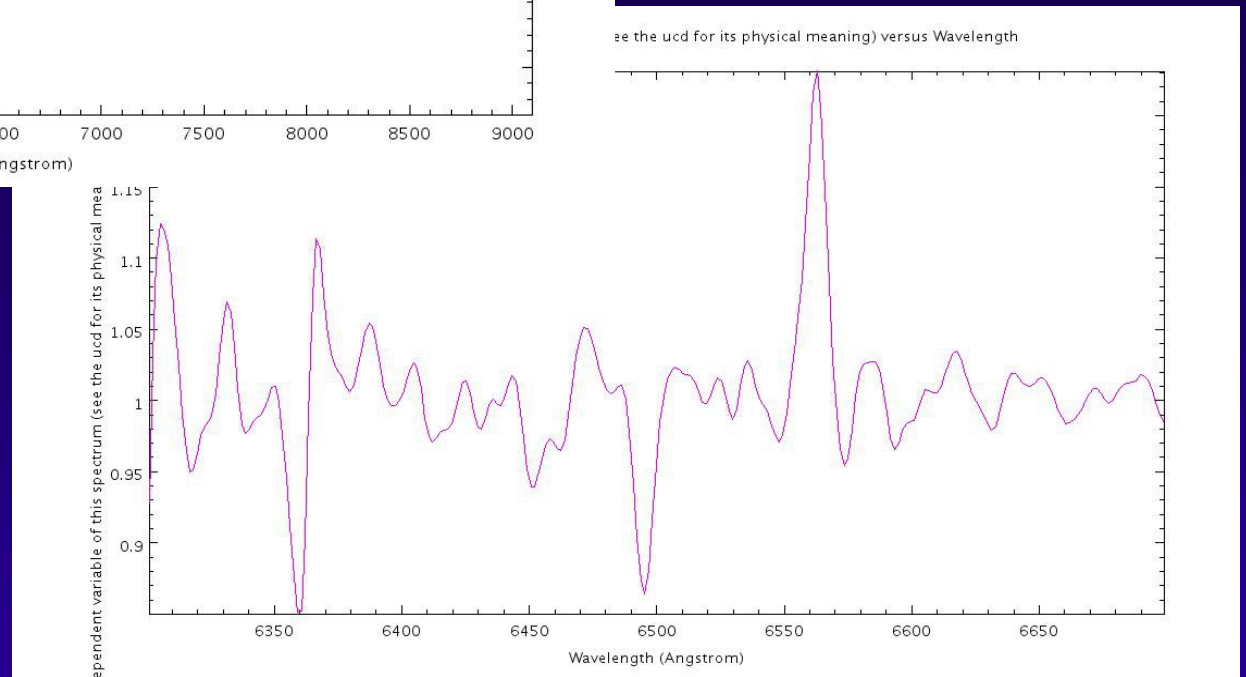
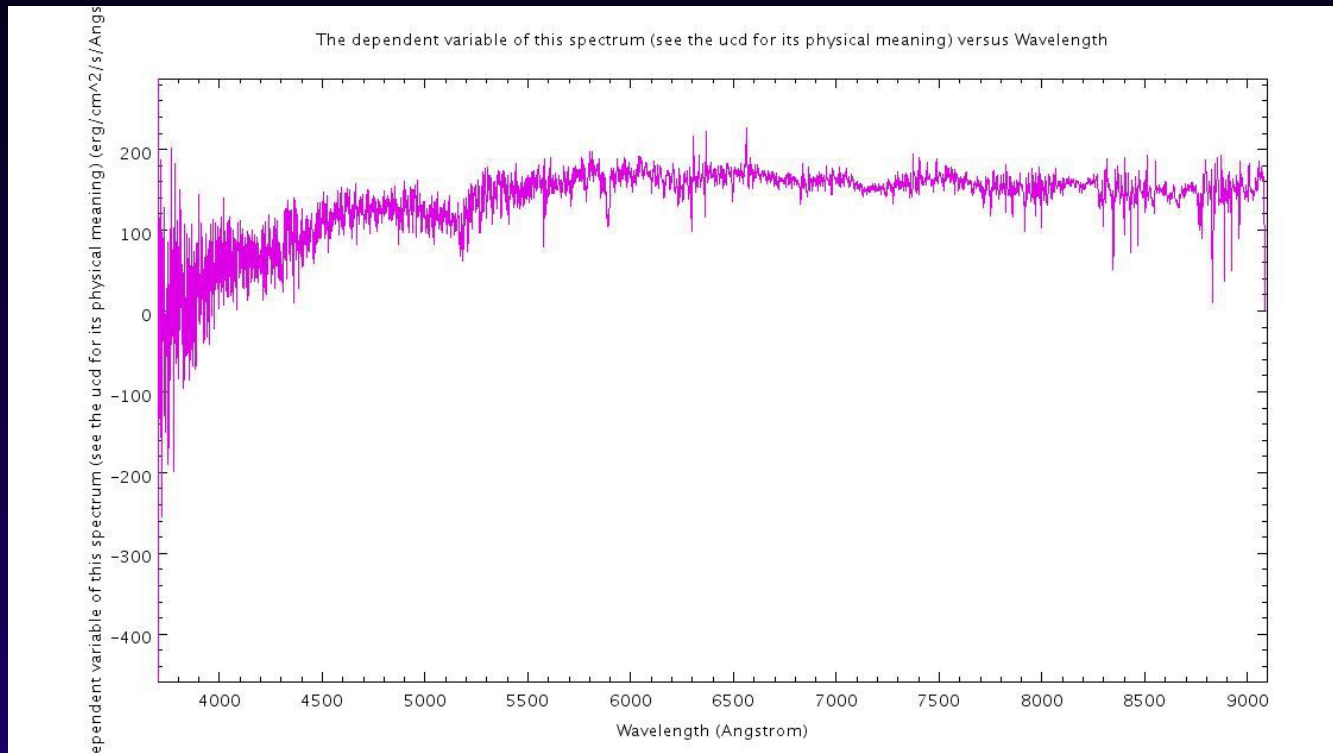
3700-9000Å R~1800 16 spectrographs 4000 fibers

VO-compatible LAMOST Archive in Ondřejov

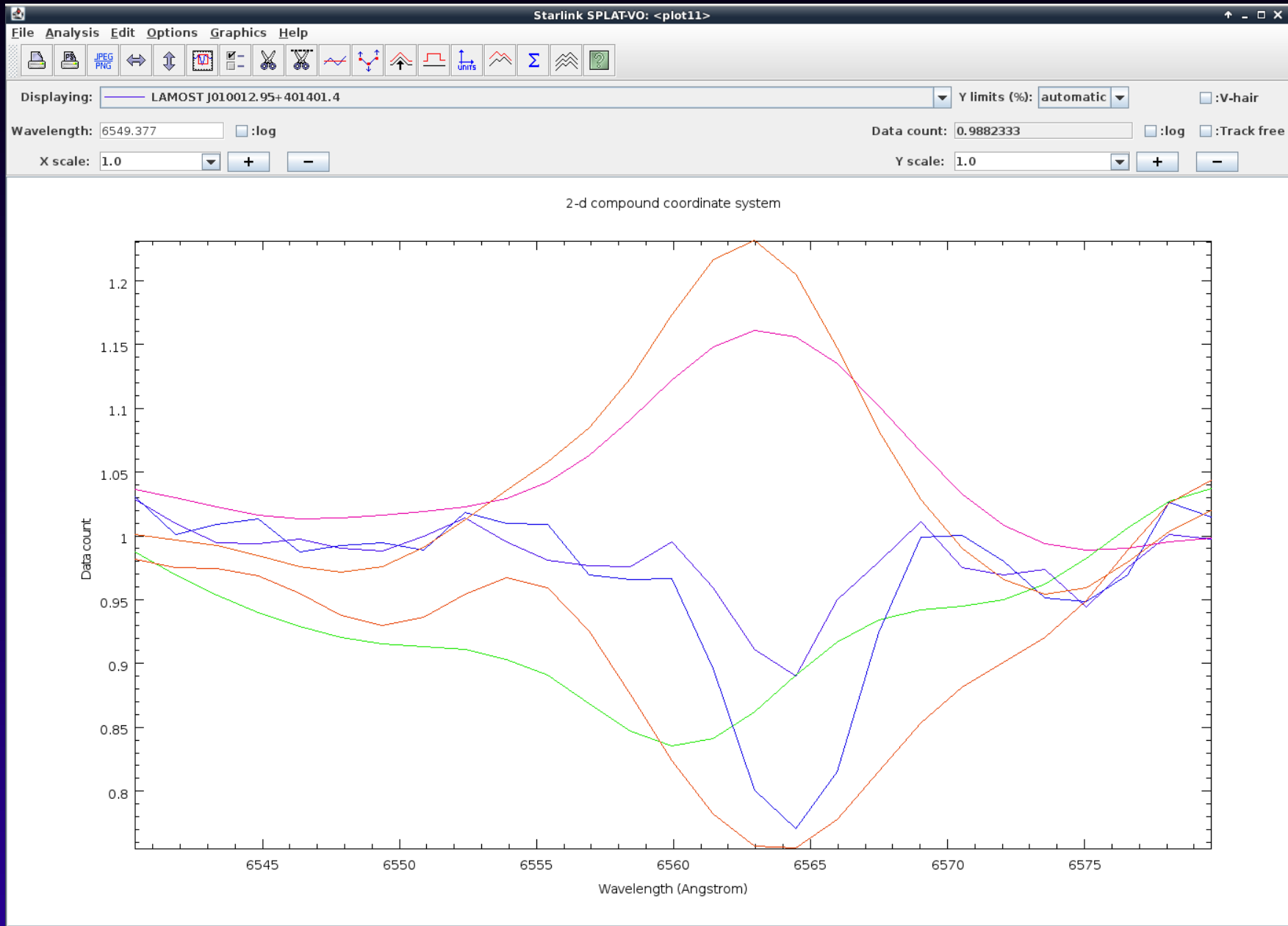


Thanks: Chenzhou Cui + all China-VO and LAMOST team
Jiří Nádvořník and Markus Demleitner

LAMOST with VO in Ondřejov



LAMOST emission candidate



LAMOST Query Ha region

Starlink SPLAT-VO: Query VO for Spectra

File Options Resolver Interop Help

Options Tags

Observed data
 Theoretical data

Source
 Survey TH
 Custom Ar

Wave Band
 Radio Mi
 Optical UV
 X-ray Ga

Search parameters:

Simple Query

Object: Lookup

RA: 1:00:05 Dec: 40:14:48

Radius: 2

Band: 6300e-10 / 6700e-10

Time: /

Optional Parameters

Add Parameter Remove Parameter

Query Format: ALL

Wavelength calibration: None

Flux calibration: None

Query: <SERVER>?REQUEST=queryData&POS=15.020833333333334,40.24666666666667&FORMAT=ALL&SIZE=0.033333333333333333&BAND=6300e-10/6700e-10 **SEND QUERY**

Query results:

HEAVENS @ ISDC LAMOST PILOT LAMOST-DR1

000	ssa	tar	subclass	accrref	owner	embargo	mime	accsize	ssa dstitile
3373	K7	http://vos2.asu.cas.cz/getpro...					image/fits	92160	lamost_dr1/data/fits/VB016N3...
3373	K7	http://vos2.asu.cas.cz/getpro...					application/x-votable+xml	92160	lamost_dr1/data/fits/VB016N3...
4663	G5	http://vos2.asu.cas.cz/getpro...					image/fits	92160	lamost_dr1/data/fits/M31016N...
4663	G5	http://vos2.asu.cas.cz/getpro...					application/x-votable+xml	92160	lamost_dr1/data/fits/M31016N...
5761	F9	http://vos2.asu.cas.cz/getpro...					image/fits	92160	lamost_dr1/data/fits/M31_016...
5761	F9	http://vos2.asu.cas.cz/getpro...					application/x-votable+xml	92160	lamost_dr1/data/fits/M31_016...
2029	K1	http://vos2.asu.cas.cz/getpro...					image/fits	92160	lamost_dr1/data/fits/VB016N3...
2029	K1	http://vos2.asu.cas.cz/getpro...					application/x-votable+xml	92160	lamost_dr1/data/fits/VB016N3...
554	G2	http://vos2.asu.cas.cz/getpro...					image/fits	92160	lamost_dr1/data/fits/M31_016...
554	G2	http://vos2.asu.cas.cz/getpro...					application/x-votable+xml	92160	lamost_dr1/data/fits/M31_016...
4663	K5	http://vos2.asu.cas.cz/getpro...					image/fits	92160	lamost_dr1/data/fits/M31_016...
4663	K5	http://vos2.asu.cas.cz/getpro...					application/x-votable+xml	92160	lamost_dr1/data/fits/M31_016...

SSAP Servers

- SSAP Servers
 - 3XMM-SSA
 - 6dF Spectra
 - <-> [Ultr]
 - AXIS-XMS
 - BeSS [Be]
 - BeSS_SSAP
 - califa ssa
 - castor [E]
 - CCD700 DL
 - CCD700-nopr
 - CCD700-proc
 - CDFS SSA
 - CENCOS-VVDS
 - Coelho [C]
 - COND00
 - COROT ARCHI
 - Dallessio
 - dk154 [c]
 - DUSTY00
 - ELODIE [E]
 - ELODIEinterp
 - ESO SAF SSA
 - ESO_SSAP
 - EUVE [Ex]
 - EUVE(1)
 - FEROS SSAP
 - Flash/Heros

Remove selected

Quer... Add Ne...

Display selected Display all Download selected Download all Deselect table Deselect all DataLink Services

Save query results Restore query results Close