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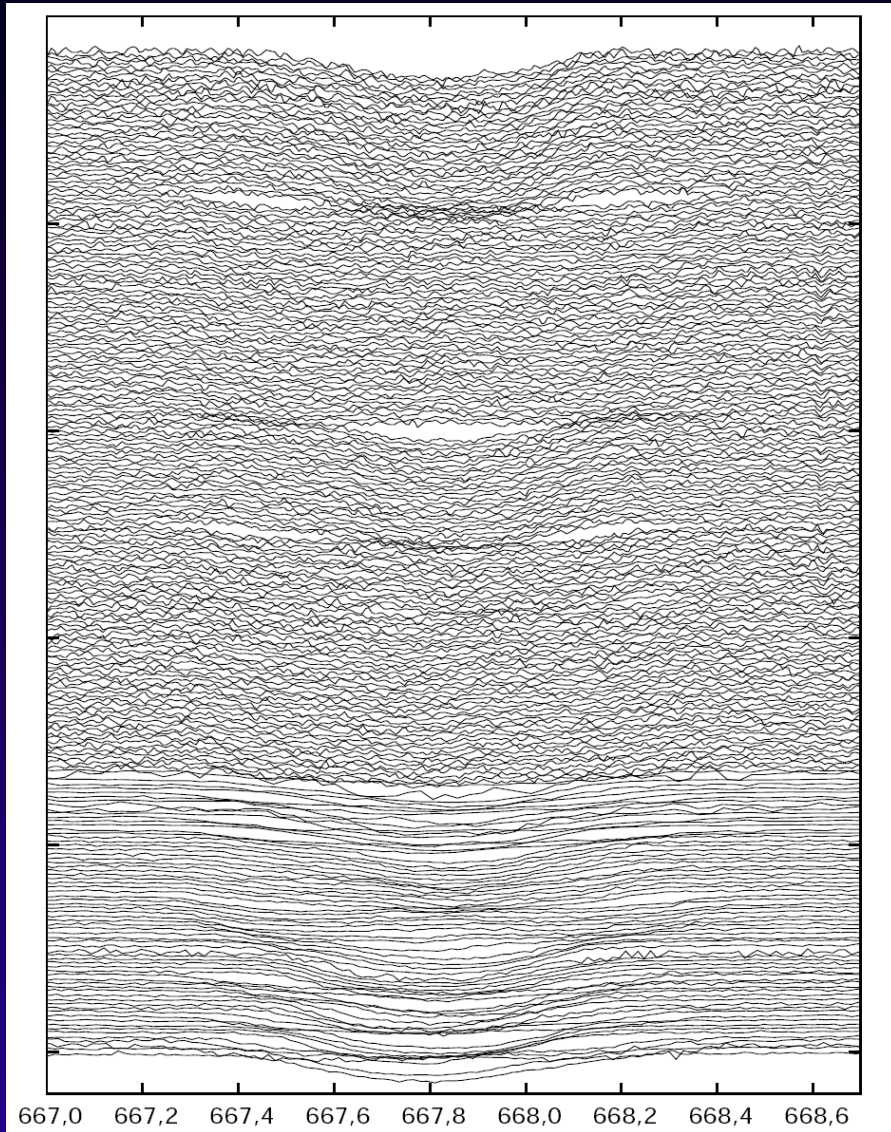
Petr Škoda

Astronomical Institute Academy of Sciences
Ondřejov
Czech Republic
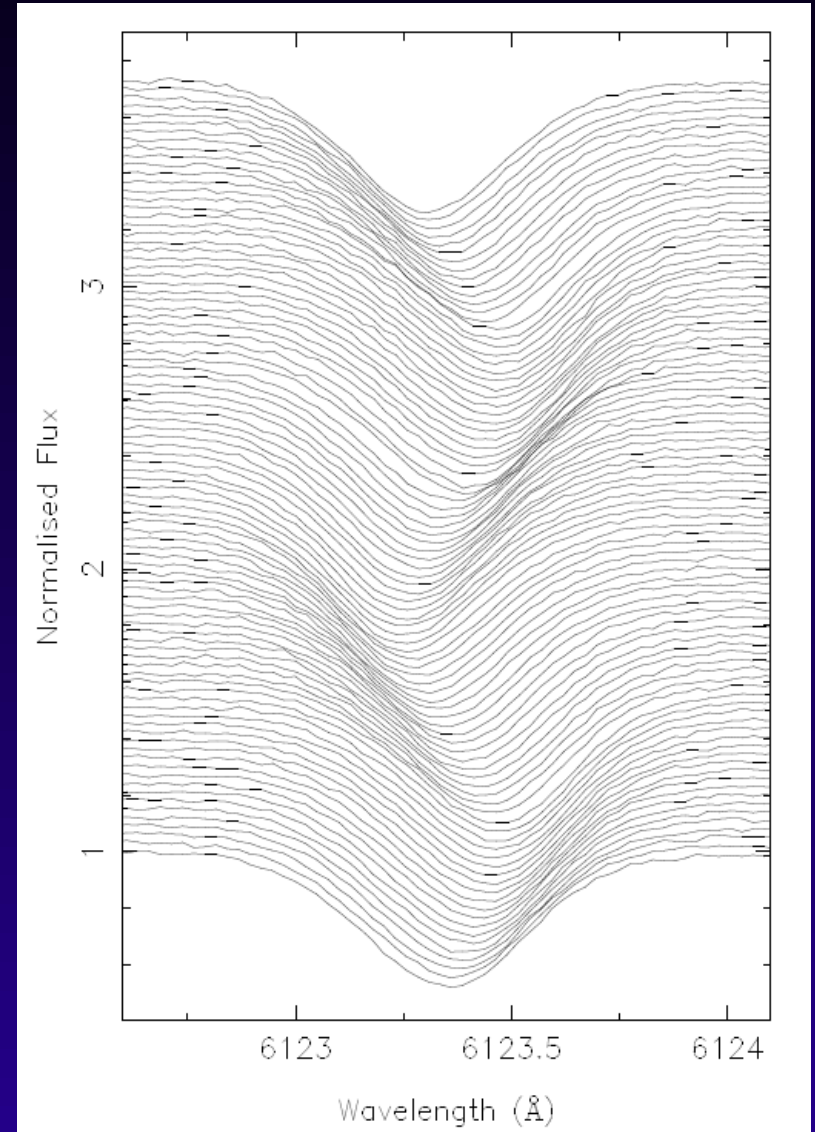
IVOA Interoperability workshop, Applications I session,
ESAC, Villafranca del Castillo, Spain, 22th May 2014
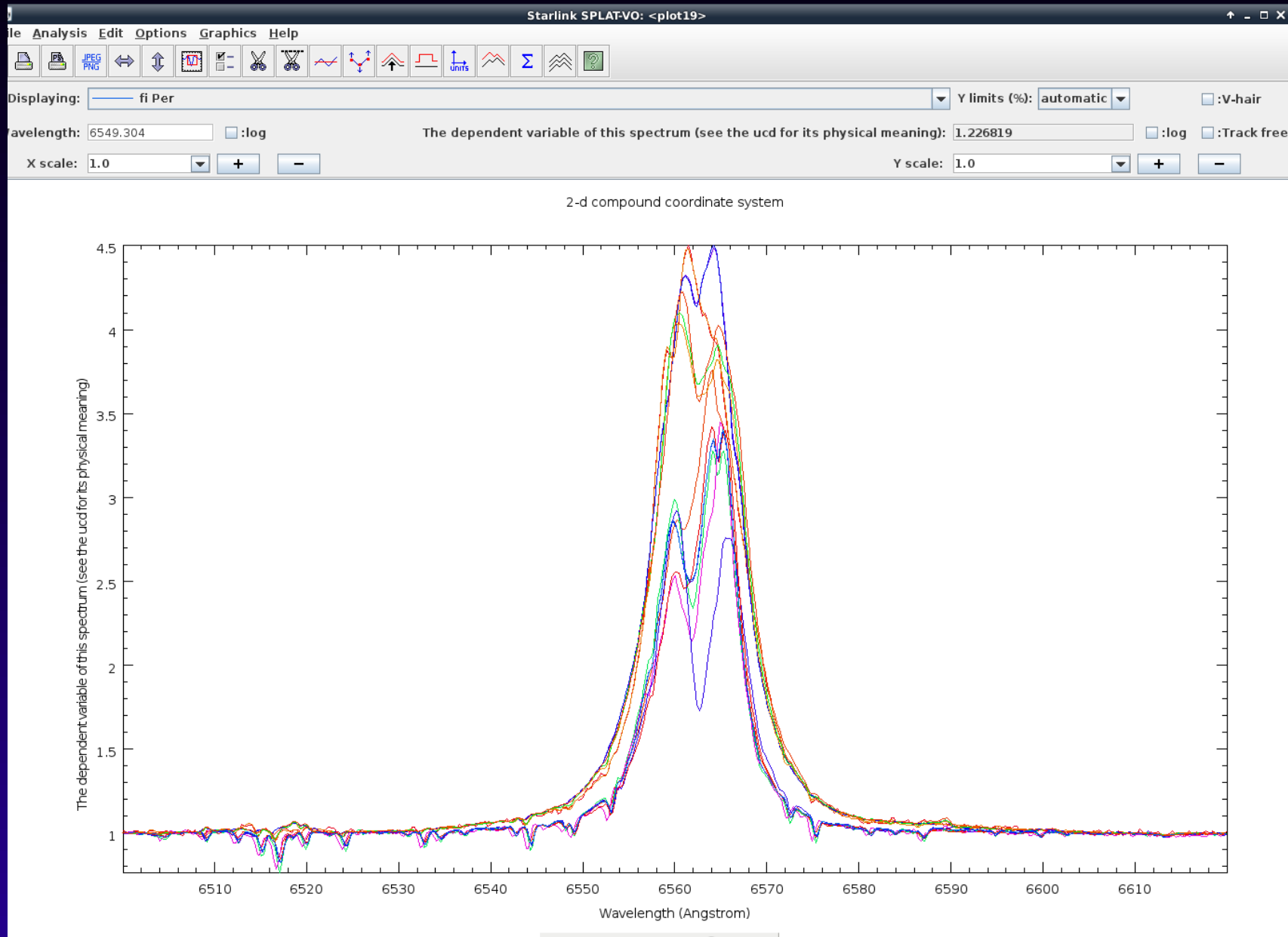
Motivation - LPV

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 diiferent 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, CDELT
    - LAMOST, SDSS in rebinned log lamda !
    - Should be transparent – before cutout ?
    - Concept of NATIVE

Ond2m Archive - Stable Emission

Star: psiper
Count: 17
First: 2003-09-15
Last: 2011-12-07
Diff: 3005 days
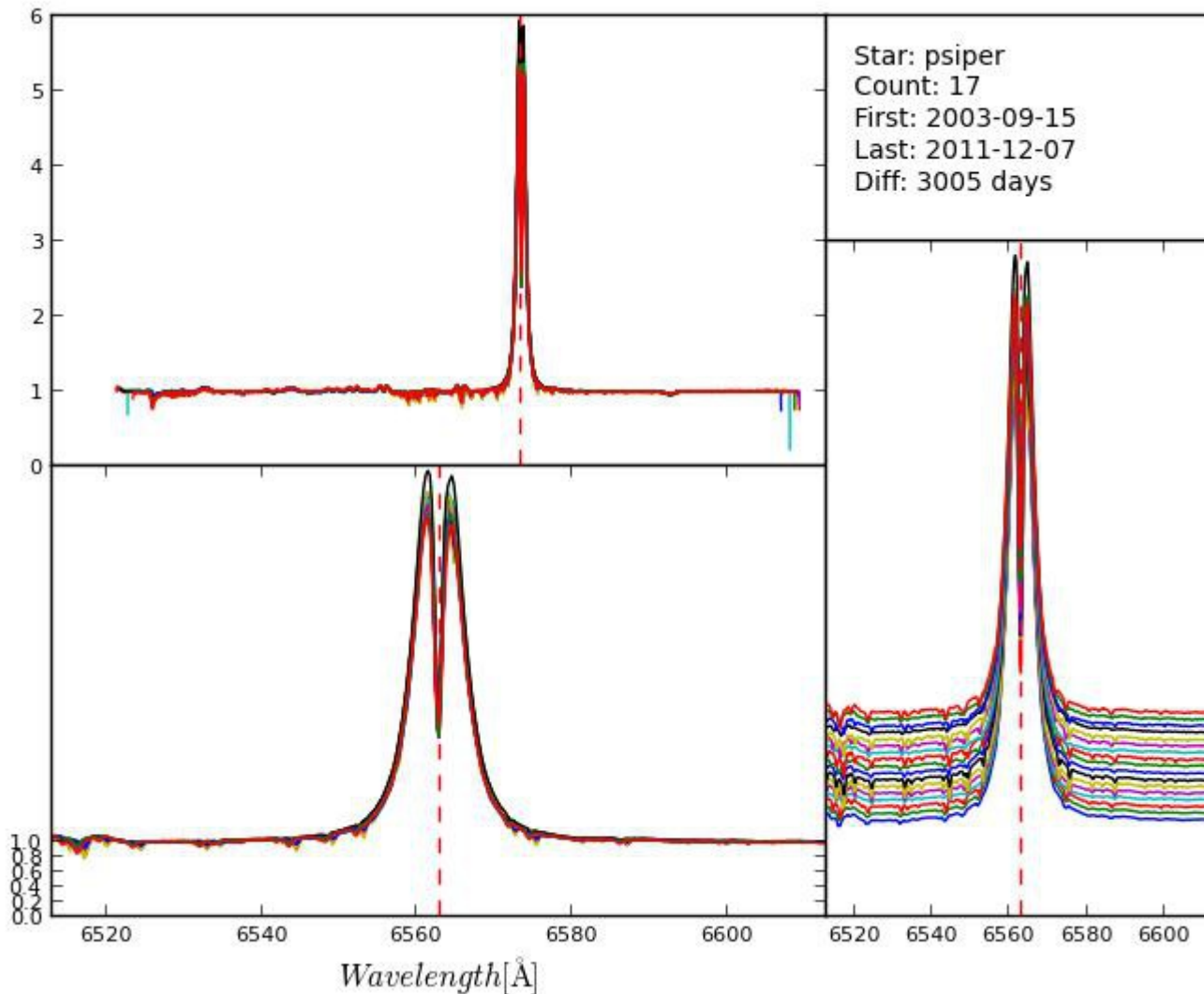
Automatic normalization, cutouts on SSAP server,

SAMP to SPLAT-VO analysis

12000 spectra of >1000 stars

Stable samples needed for DM

Ond2m Archive – Unstable Emission

Star: otgem
Count: 13
First: 2003-04-20
Last: 2011-02-24
Diff: 2867 days
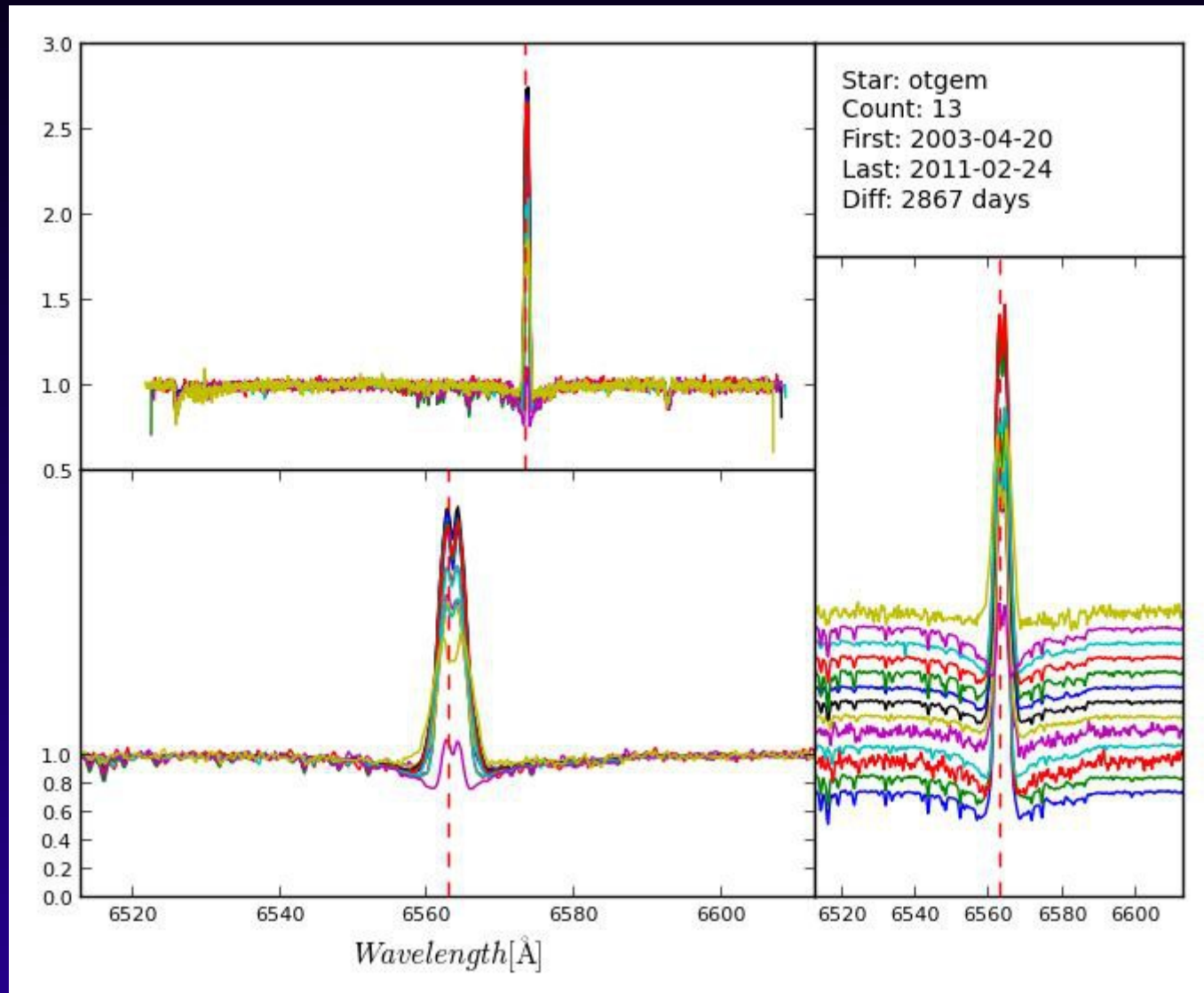
SDSS Spectra Survey - DR10

3,3 mil spectra (684 000 BOSS)

1 848 851 galaxy

308 377 quasar

736 484 stellar

57 454 stellar IR
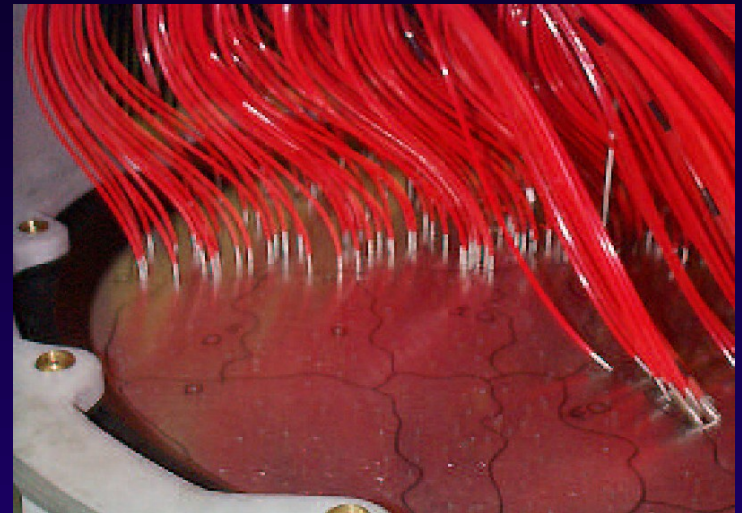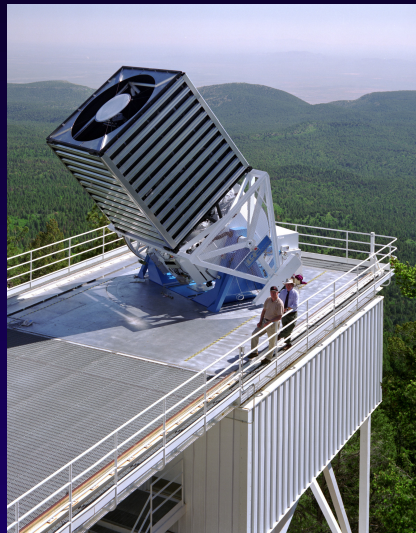
2 spectrograph SDSS-I   3800-9200 A   R 1800-2200   640 fibers
                 BOSS   3600-10400 A   R 1500-2600   1000 fibers

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

Candidates – Similarity !
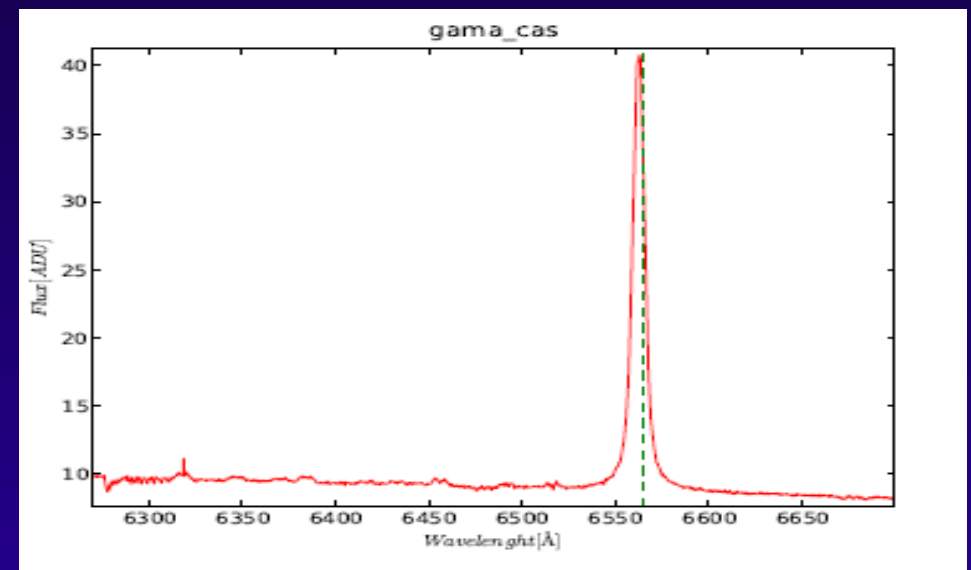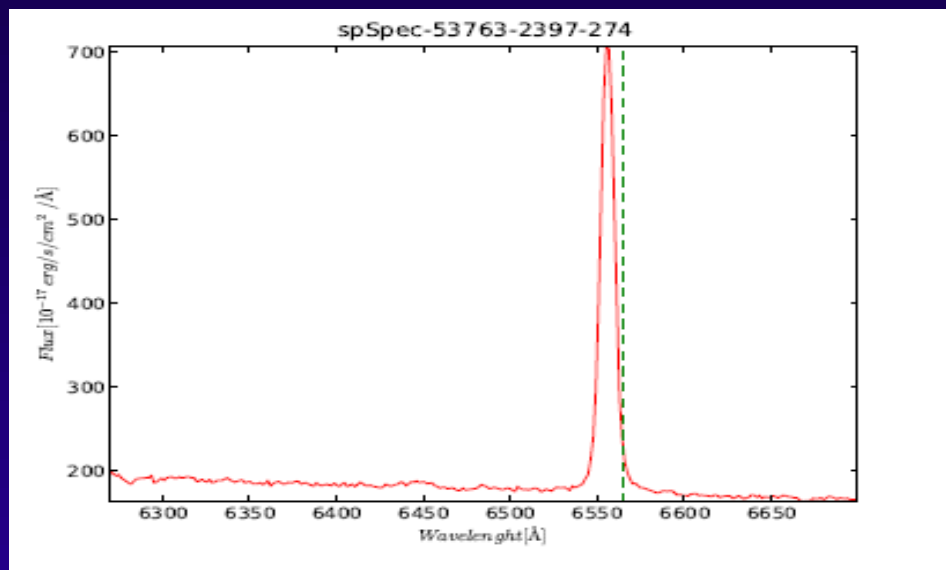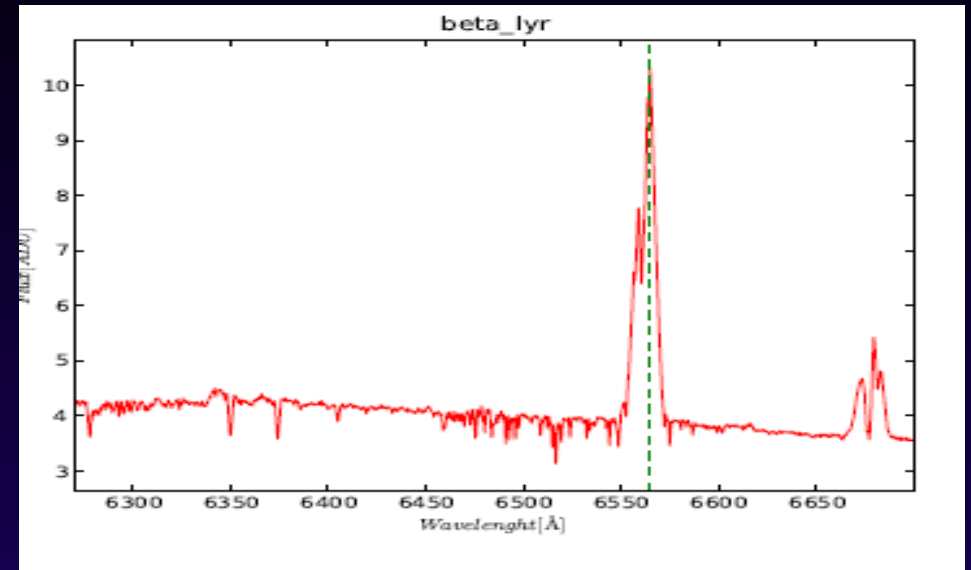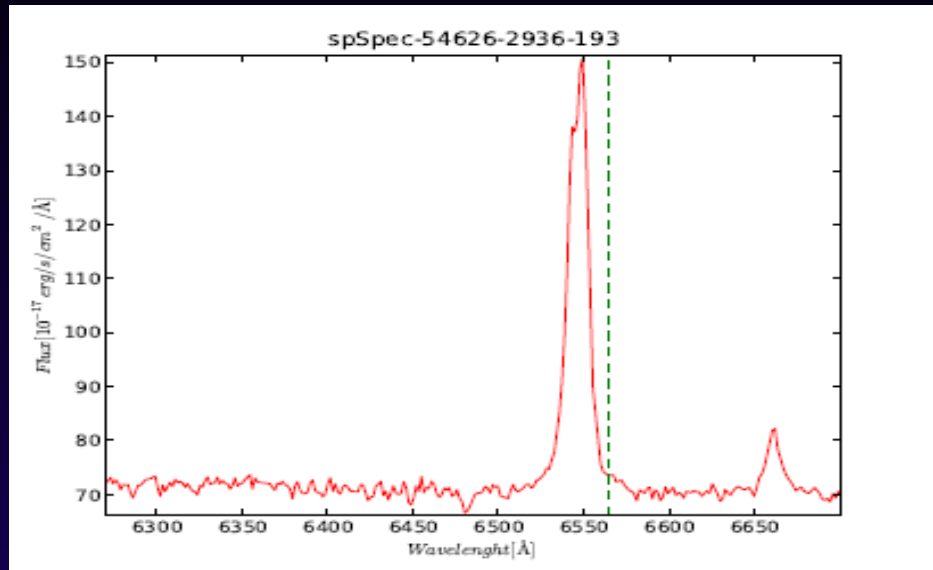
LAMOST (Guoshoujing)

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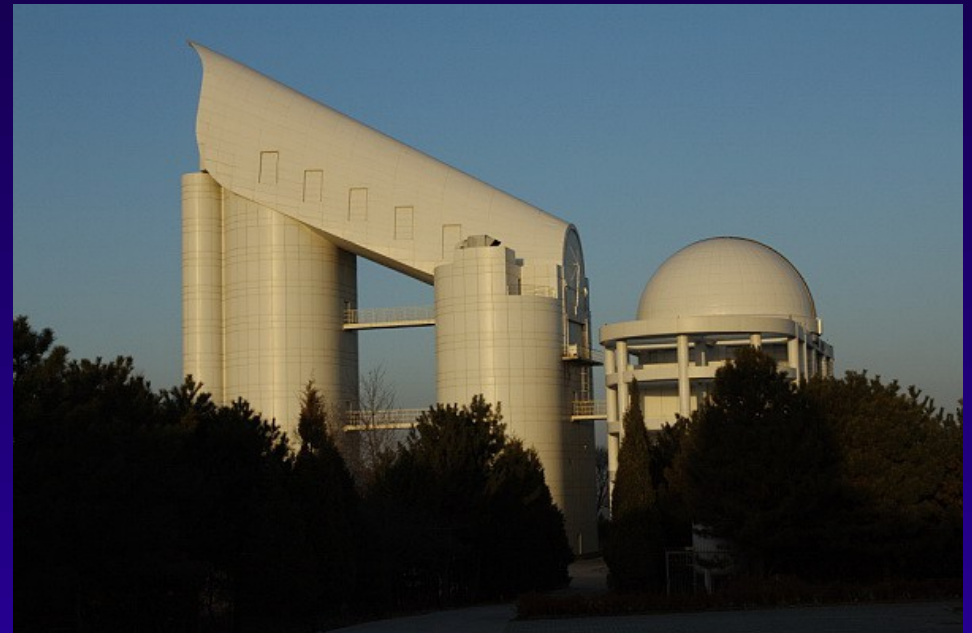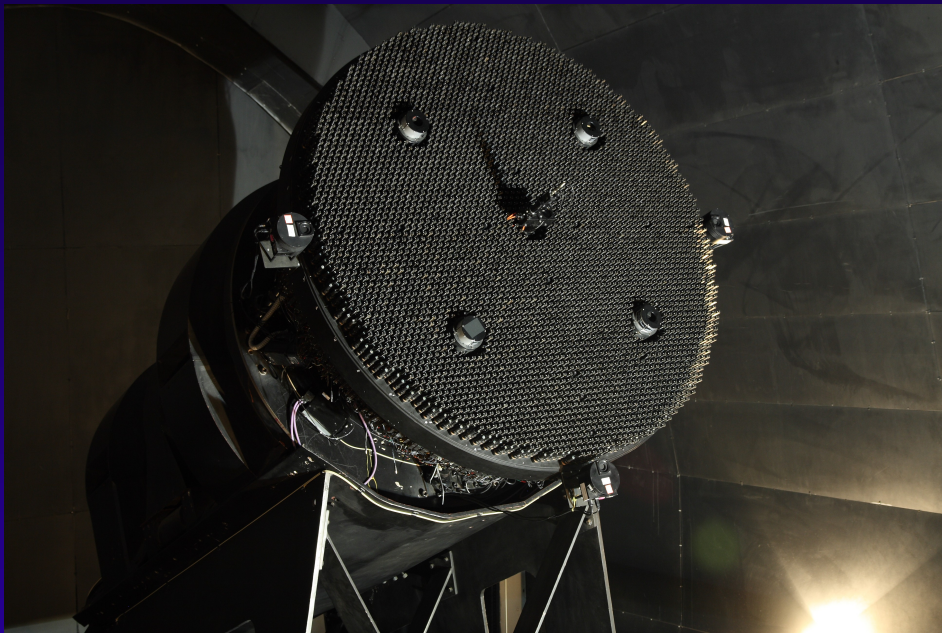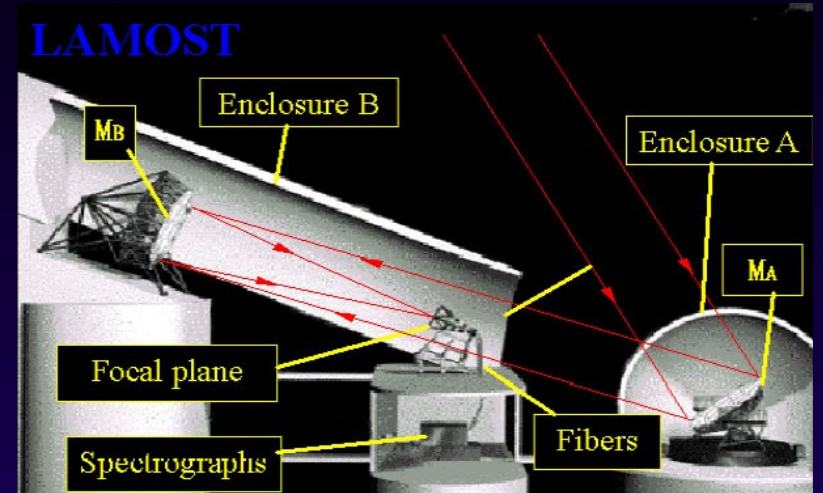
LAMOST Spectral Surveys

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

3700-9000A   R~1800 16 spectrographs 4000 fibers

VO-compatible LAMOST Archive
in Ondřejov

LAMOST with VO in Ondřejov
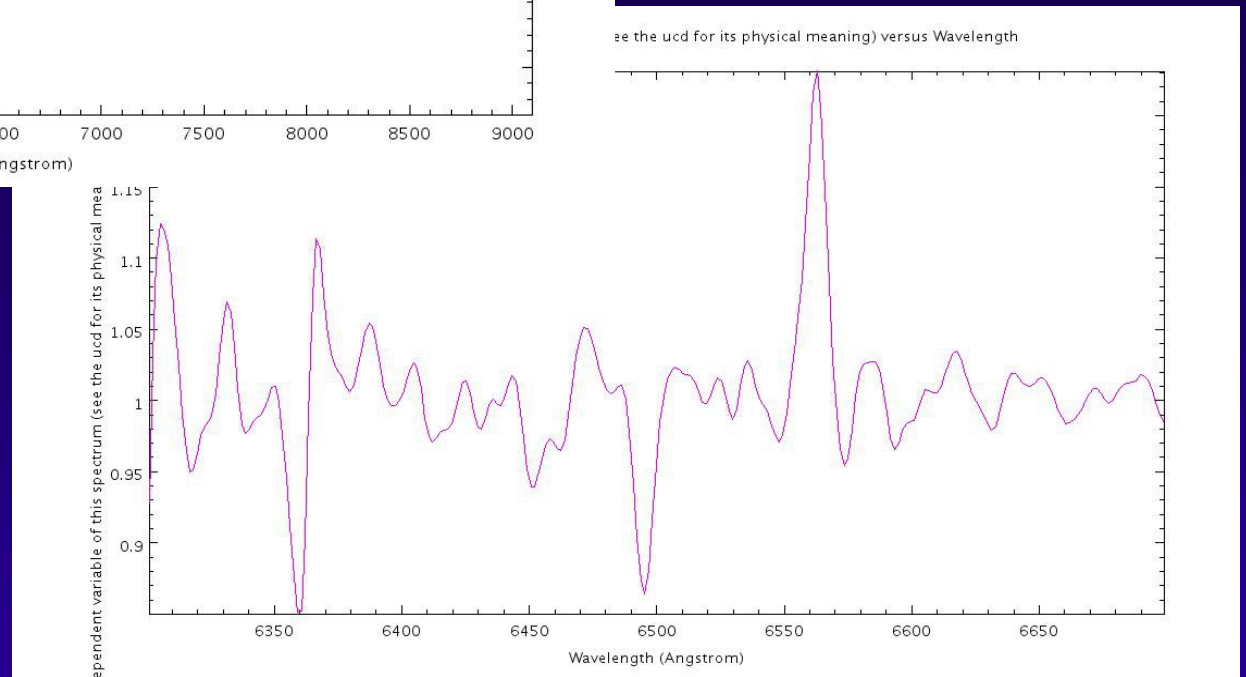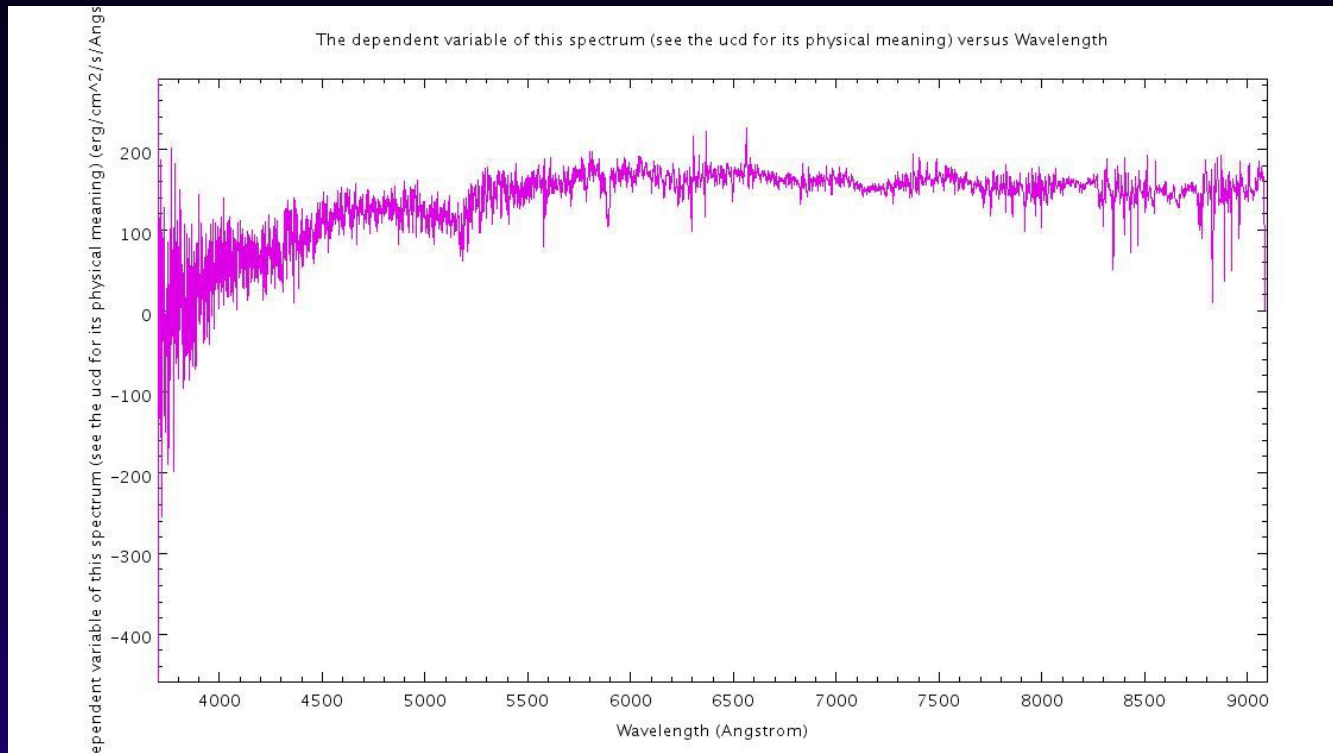
LAMOST emission candidate

LAMOST Query Ha region