Stellar Optical spectroscopy in VO and SSA Relevant Issues

(View of users and potential providers)

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Stellar Spectroscopy

- Crucial for understanding of the Universe, but often disregarded in current scientific boom (Extragalactic, Cosmology) → low IVOA attention (priorities) (+ bias of experts wrt VO).
- Important aspect – variability on detailed level
  - Nature of physical processes and their evolution
  - Cosmology → f(Stellar Spectra Synthesis)
  - → f(evolution of individual stars)
  - → binarity, mass loss, Mag. Fields, winds, rotation...

Škoda 2009, The Stagnation of Contemporary Stellar Astronomy, Proceedings of the special session "Accelerating the Rate of Astronomical Discovery" of the 27th IAU General Assembly. August 11-14 2009. Rio de Janeiro, Brazil, Published online at http://pos.sissa.it/archive/conferences/099/016/sps5_016.pdf

Ground - based stellar spectroscopy in VO

- Few SSA resources (68 all, 30 TSA, 18 space, 2 time series, 18 ground (multiplicity)
- Little involvement of smaller providers (tens of 2-5m class telescopes with spectrographs)
- Little willingness (VO- awareness, funds, jealousy (metadata hiding in exoplanets...)
- Almost no science usage (small contribution of convincing experts – priorities)
- Most VO education goes on space spectra +SED
- VO „flagship“ - SDSS not in VO protocols!

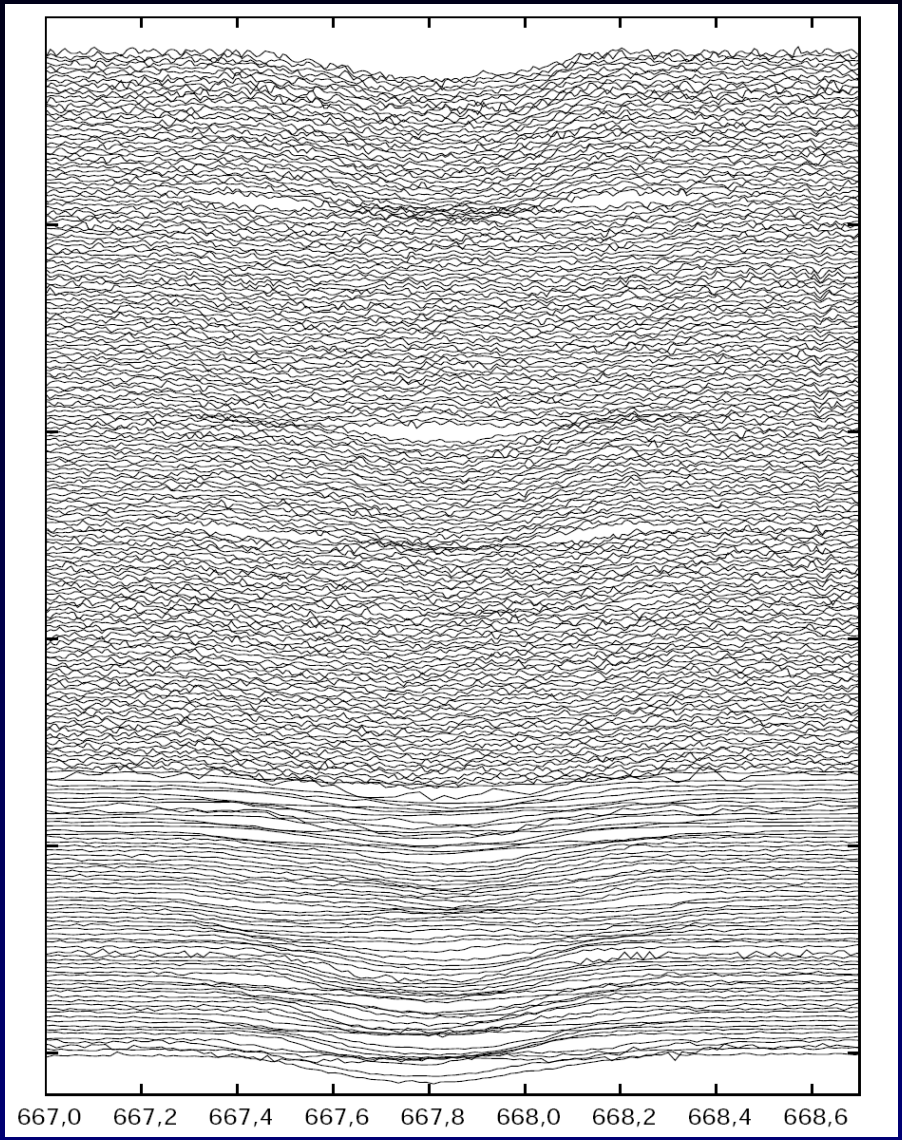
VO - Relevant Aspects

- Typical spectral analysis
- High resolution (echelle) + long time series → bulky
- (Changes) of individual line profiles
- Ground based (details → largest instruments)
- OPTICAL, in „bad“ conditions (gray night, seeing)
- Rarely absolute flux (no interest in SEDs!)
    - – best NORMALIZED to continuum
- Manual analysis (the Astroinformatics still ignored)
    - Special analysis tools (stacking, profile mirroring...)

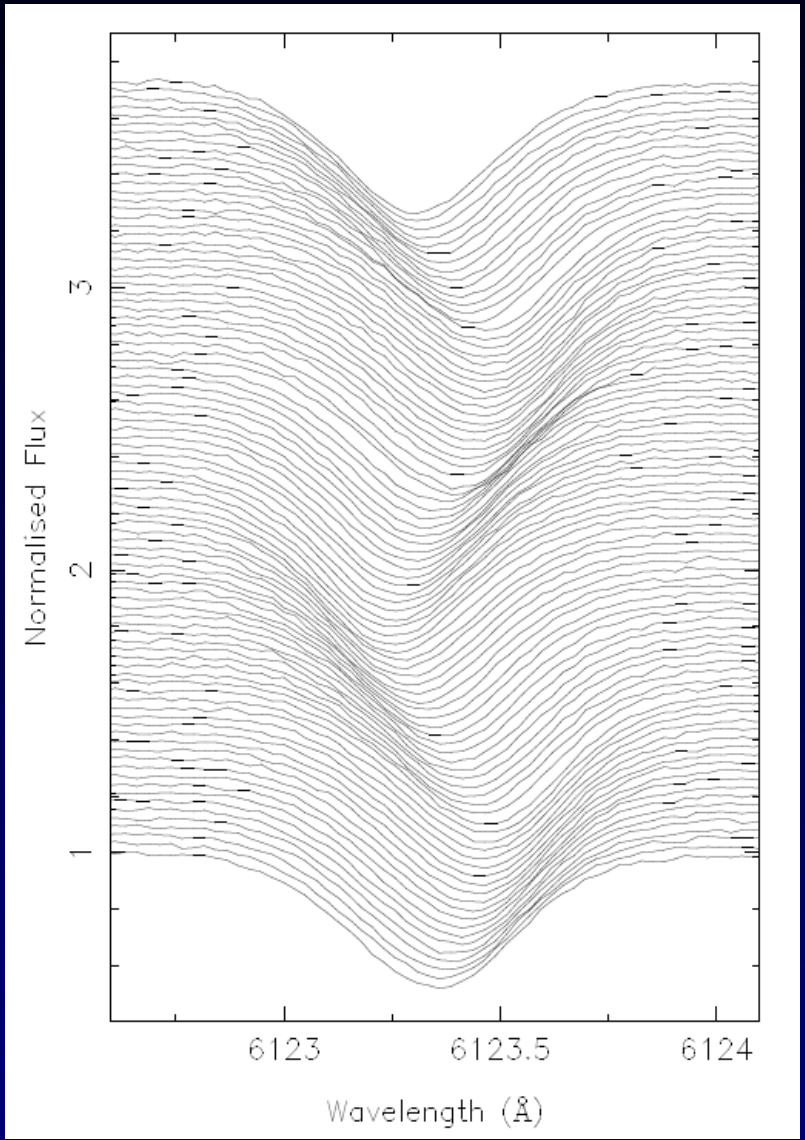
NORMALIZED spectra in VO

- Most optical spectra in two versions
  - 2 files, same metadata, FLUXCALIB=NORMALIZED
  - other directory
  - automatic normalization for stacking
- How to refer to the continuum curve ?
  - Problems with reduction packages
  - As a separate fit, switch on
  - Processing after query NORMALIZED or separate access in a model ?

LPV



V436 Per Janík 2003



Rho Pup, Aerts et al.

Size of data matters

- Typical echelle (>60 orders x size of CCD)
- Currently in VO only merged 1D – LONG spectrum
- TIME of transfer (even on local net) + MEMORY of client
  - to get 1 spectrum like >60 ordinary (low res, X-ray)
  - Example – UVES 110000 points (2x), HARPS 313000
- Massive processing not feasible → CUTOUT service
- ALL SSA Services should provide it (Rec for high res)
- Other practical issues (visualization of details on screen) waste of resources (download long and drop most)

Spectra Postprocessing Service

- Normalization critical (FT, Crosscorellation RV, LPV)
- Current funcionality
  - Different ServiceURL for cutout (BAND select/cut)
- Future development
  - Rebinning – how to specify in SSA ?
  - Transformation described by params (SSAv2???)
  - Instrument profile (de)convolution
  - Broadening functions (rotation, limb dark) for TSAP
  - RV/z shift
  - Combining diiferent spectra – resolution power
  - Role of Characterization !

Troubles of Enthusiastic Users

(mostly SPLAT, some VOSPEC – accustomed to local FITS (not only VO), more intuitive, relaxed Query requirements (TARGETNAME, no POS – important browsing archives – but not supported often) -

Most VO requires to know the object exactly – what the curious should do

But query by POS or TARGETNAME returns all TSAP services (should not ?) and TIME SERIES

SSA services – multiple instruments (ESO SSA) - no way how to select , flux calibration pretended (units)

difficult labeling – see the 100x Vega – not other attribute – difficult selection (SPLAT: labeling name

How to work with Light Curve ? How to separate it ?

Troubles of Enthusiastic Providers

SSAP and SDM – too academic (circular ref.)

No full practical examples for simple case

(I have a 1D IRAF reduced spectra – what should I do to establish SSA service ?)

DAL server not help (binary FITS, mapping of Charac, VOSI, UTYPES, STC ....)

Reading IVOA -Wiki : What is current ?

New stuff hidden (DAL WG page is confusing)

Examples of working services ?? (pre 1.0, VOX:)

VO publishing workshops nice but hard to know, attend