

# **KOREL-VO - The small RESTful "cloud" environment for stellar analysis**

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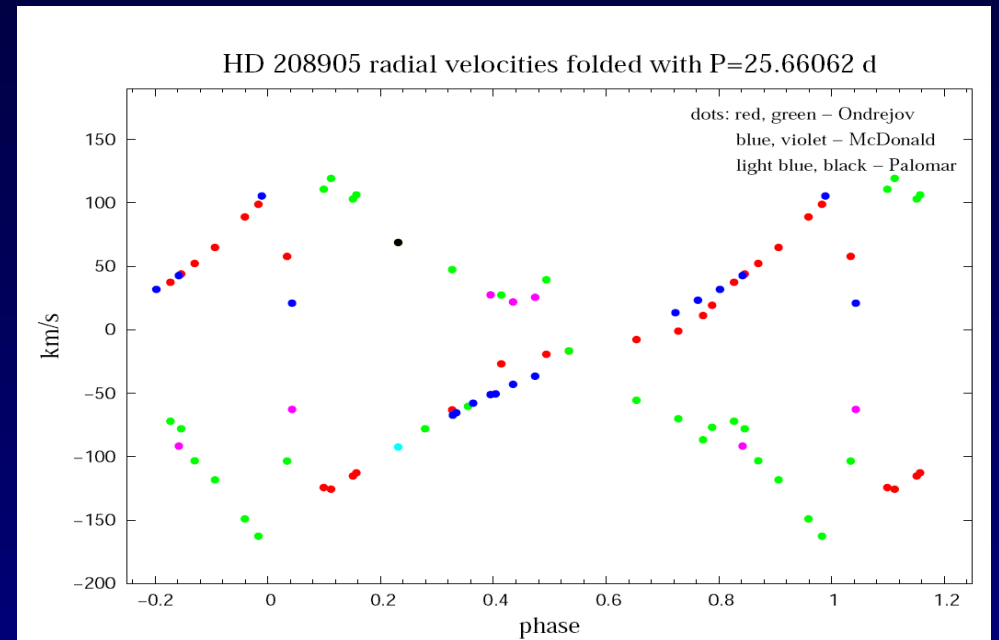
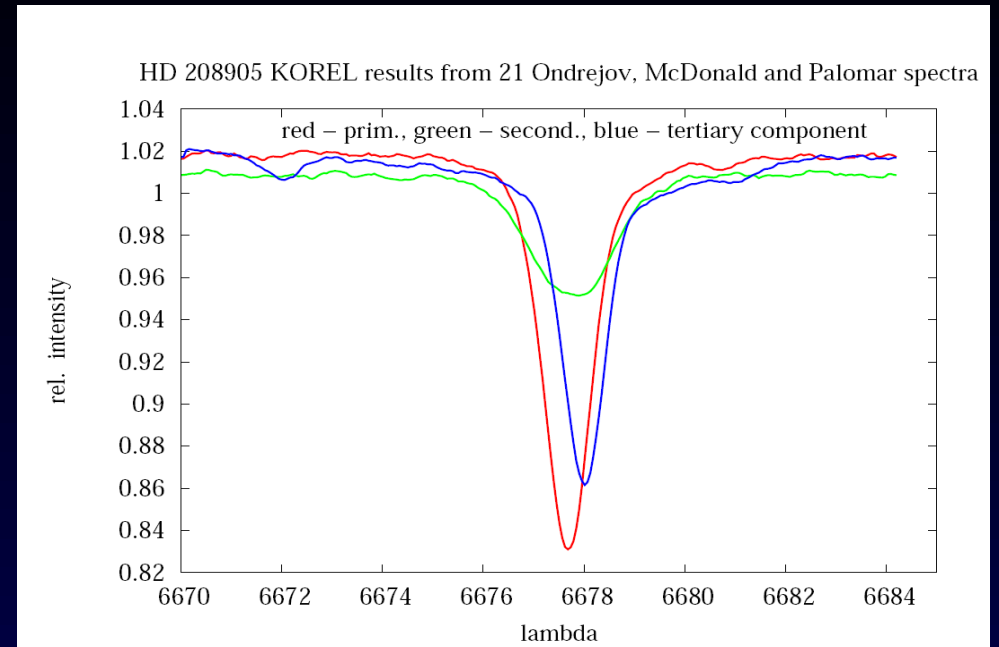
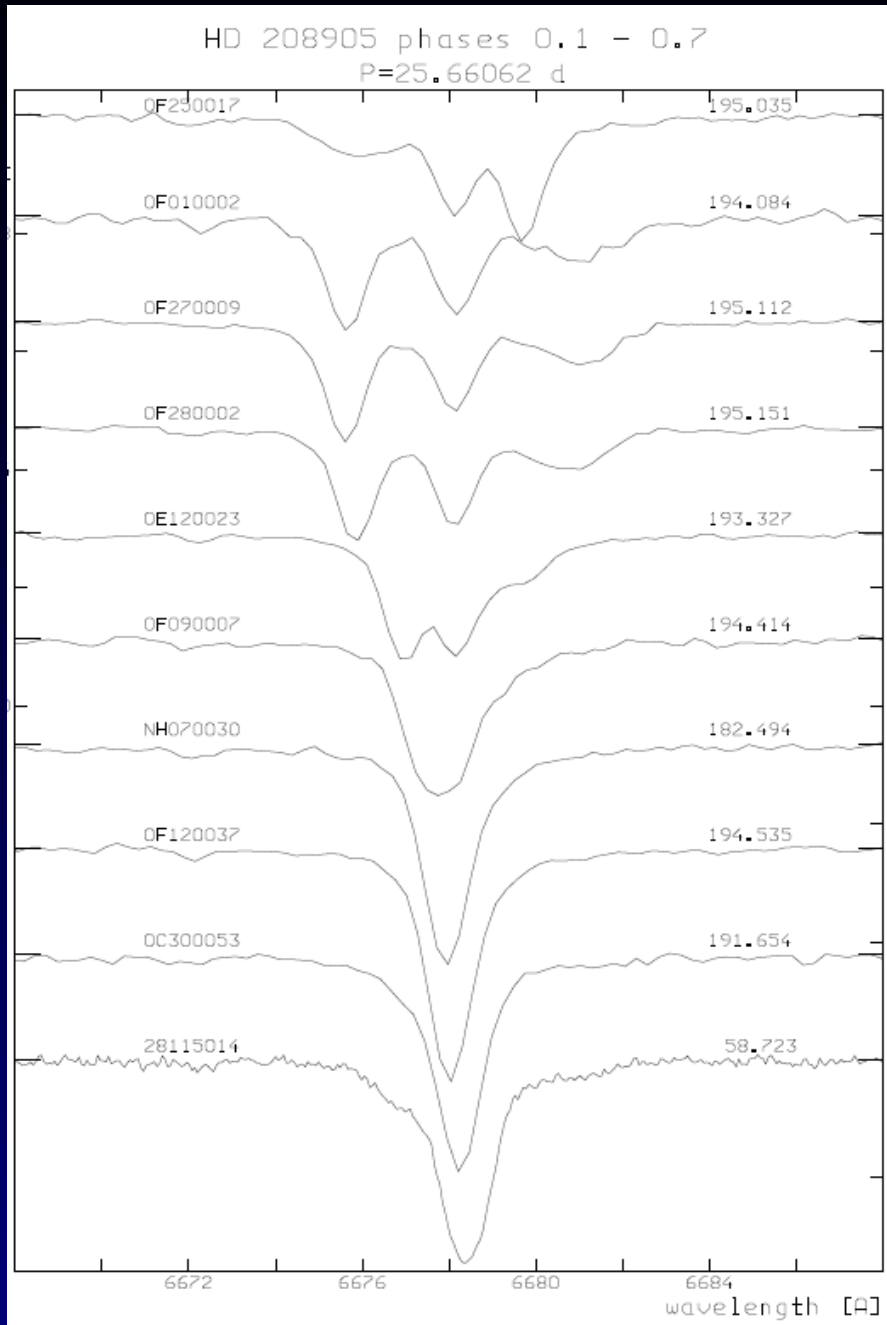
Astronomical Institute Academy of Sciences  
Ondřejov  
Czech Republic

IVOA Interoperability meeting GWS Session 2,  
ESO Garching, 9<sup>th</sup> November 2009

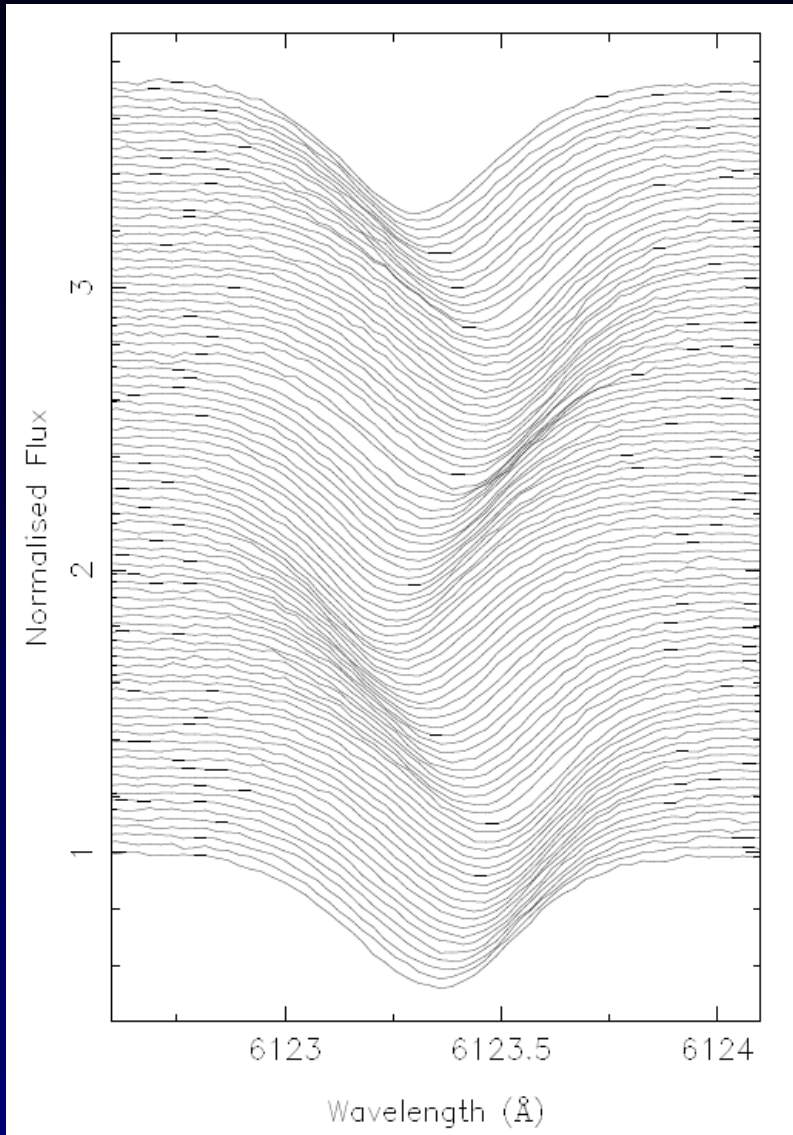
# Spectra Disentangling

- For blended spectra of binary (multiple) stars
  - Number of spectra with good orbital coverage
  - Estimate of orbital parameters
- Wavelength space disentangling Simon & Sturm 1994, 2 \*
- Fourier disentangling - Hadrava 1995, 1997 (independently 1990-93)
- KOREL (KORelation Elements x FOTEL)
- CCF, RV of blends, spectra decomposition
- Pulsation, models of limb darkening (gen. broadening fun)
- – still new theory – delta Cep Hadrava, Slechta & Skoda 2009
- Super resolution of spectra (subpixels) Hadrava 2009

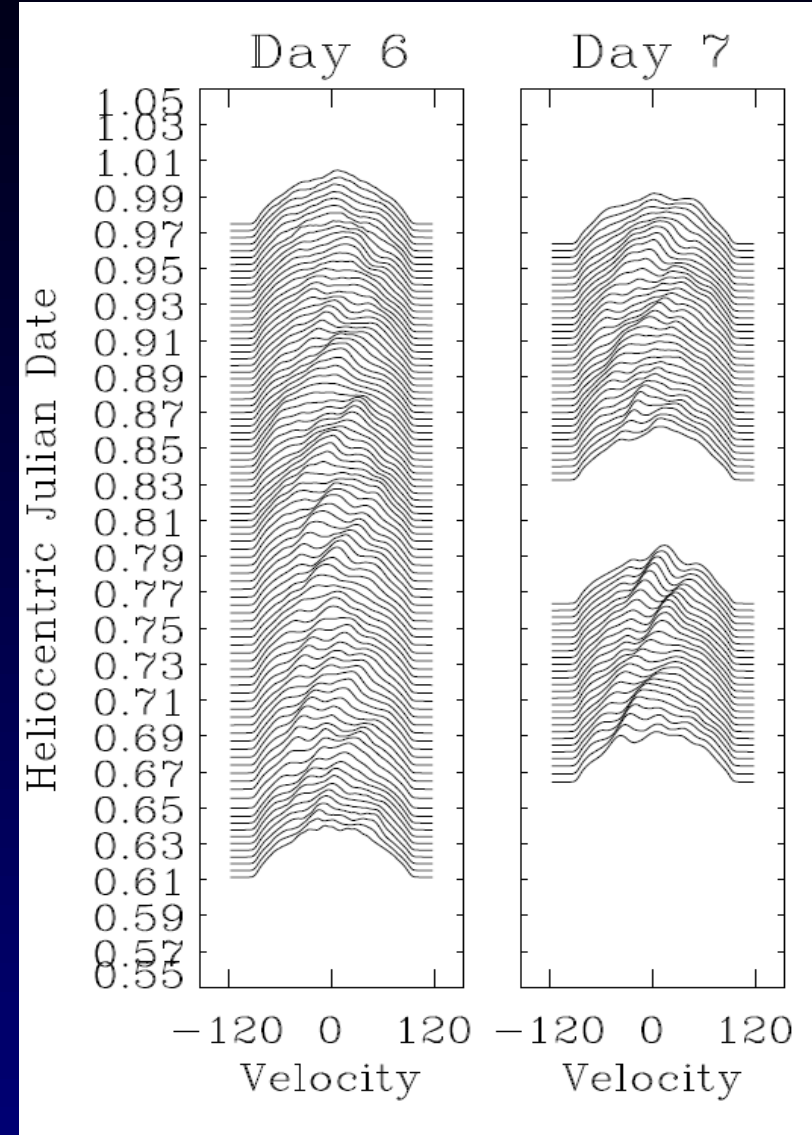
# Spectra Disentangling in Fourier Space - KOREL



# Disentangle modes - Pulsations

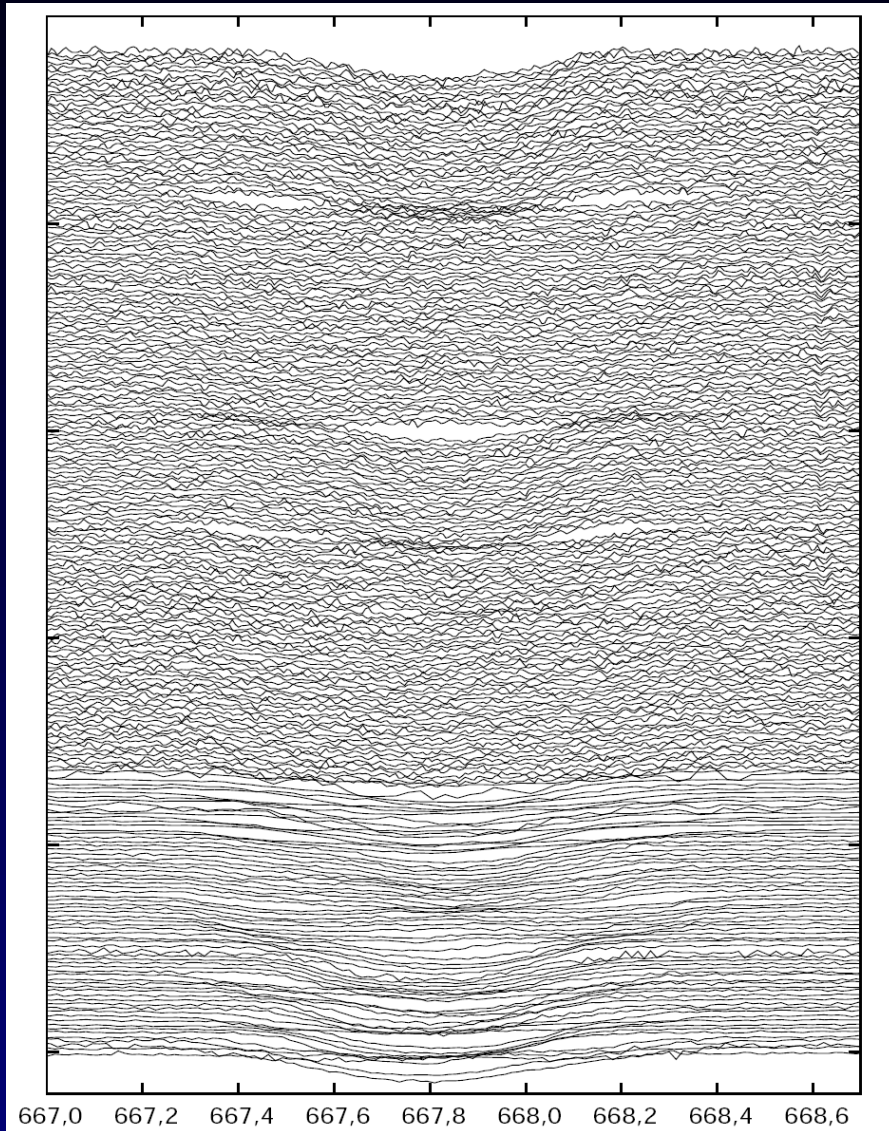


Rho Pup –  $\delta$  Sct type



Eps Cep -  $\delta$  Sct type

# PREKOR tasks



V436 Per Janík 2003

Select multiple regions

Really 100-1000s spectra

Small regions (at sharp lines)

Stack or overplot

Check ranges before FFT

rebin to common grid in  
 $\ln(\lambda)$

PREKOR role solved individually  
(Mathematica, MIDAS,  
Python)

output KOREL.DAT in ASCII



# KOREL Web Portal

- The only one place under full control of author
- The disentangling as SERVICE
- Provide program and HW (like e.g. firewalls, mail filters)
  - Official tested version (approved by author)
  - Optimized for given HW (check of limits time, size)
  - Scalable – load balance, parallel, GRID
- User registration (authorization by author, science case)
- Shopping cart model, database - “E-shop” for service
- Documentation, Forums
- Binary code - compile on demand (many, long spectra)..
- Integration of graphics, easy forms, links, GUI =Web

# KOREL Web Service

The KOREL.DAT, KOREL.PAR left on user

User authentication (and authorization - admin)

Upload parametric and data files (2-3)

Run jobs (asynch UWS)

On-the fly output of png (ps), results on click

List jobs of user – storage for limited time

Re-editing parameters, resubmit

Job control (queue, max mem, time, users ?)

Component spectra for postprocessing - models

# Concept of scientific „CLOUD“

One server for real number crunching (KOREL)

Preparation of input - PREKOR

Several postprocessing (SSA acref for VO data)

preparing custom input files , applet for SPLAT?

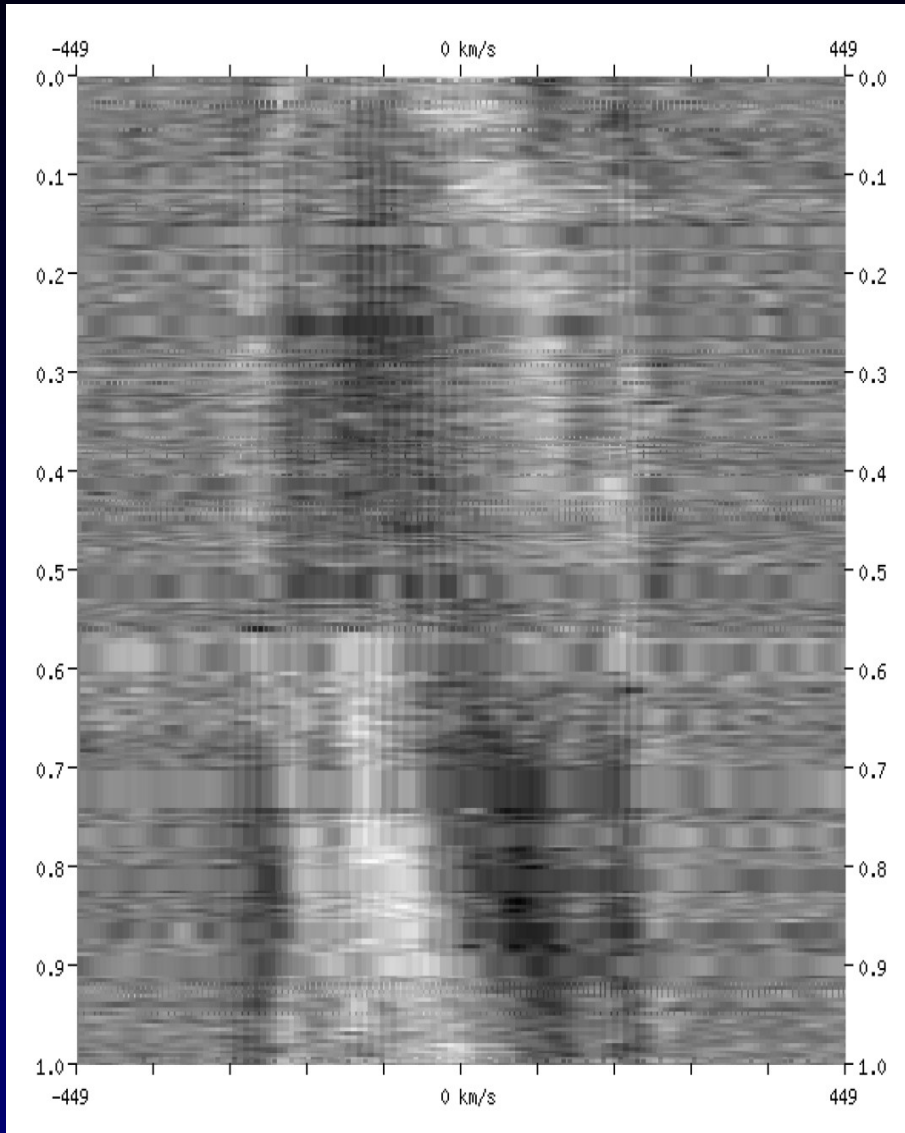
Another server for handling results – e.g. Check with theory – special postprocessing of output

- components – convolve rotation, broadening ...

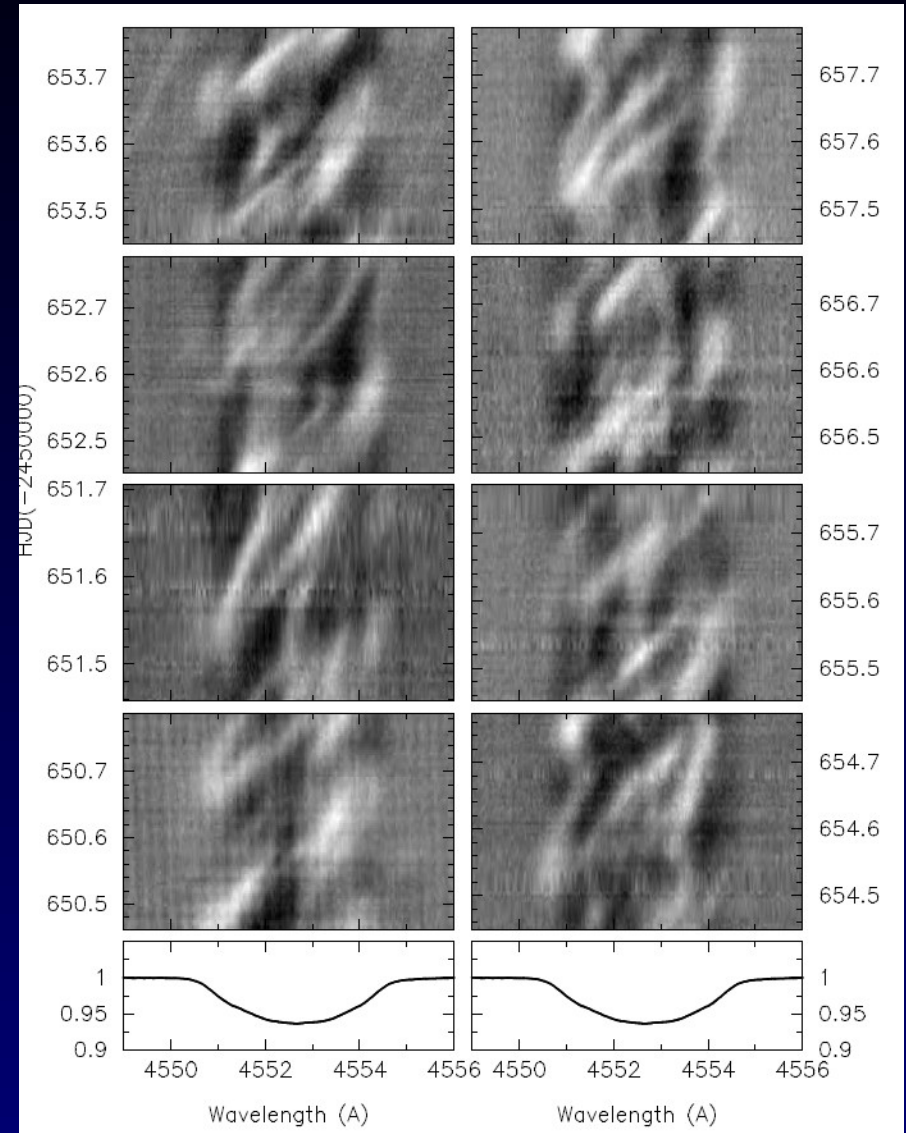
before comparison with TSAP data, user model ..



# Postprocessing - Dynamic Spectra



Netolický 2004



Lambda Sco: Uytterhoeven 2004

# Concept of scientific „CLOUD“

Why CLOUD ?

User does all the work outside his desktop  
SOMEWHERE – he does not care

He is asking the SERVICE and gets results

Using WWW browser - supercomputing in PDA/mobil

The machines OVER THERE work together for me

# NORMALIZED spectra in VO

Most optical spectra in two versions

Raw counts (unrectified, but wavelength calib)

Normalized (1.0) – most of final reports (even artistic continuum – novae , molecular bands)

How to present in VO ?

2 files, same metadata, FLUXCALIB=NORMALIZED → other directory?

How to refer continuum curve

Ratio, reference continuum ?

# Spectra Postprocessing Service

Normalization critical (continuum – long scale FT)

Current functionality

Different ServiceURL for cutout (BAND select/cut)

Future development

Rebinning – how to specify in SSA ?

Orders at echelle ? ASSOCIATION

Transformation described by params (SSAv2???)

Instrument profile (de)convolution

Broadening functions (rotation, limb dark)

RV shift

Not all in client – several servers (transform pipe)