



The *Bigorre* Astronomical Data Center

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- **Our data products**
 - Solar physics
 - *Stellar spectropolarimetry*
 - Planetary science
 - Projects: MUSE@VLT and 3D-spectroscopy, EST...
- **IVOA-Specific issues**
 - Data model: **SDM**
 - ✓ Polarimetric data
 - Tools: **VOSpec**

Our data products

- **Archiving the data of the THÉMIS solar telescope**
 - Operations started **1998** (Tenerife)
 - Archive for all the French ground-based solar instruments
 - ✓ *NRH (radio), Pic du Midi coronagraph etc.*
 - Raw and reduced data (e.g., *magnetic field maps*)
 - Very spectro-scropy/polarimetry oriented
- **Stellar spectropolarimetry**
 - Started ~ **2008**
 - Narval@TBL: high-res. *optical* spectropolarimetry
- **Planetary science**
 - Started **2009**
 - THÉMIS spectra of *Mercury's exosphere*

Projects

- **Database of the EST solar telescope**
 - Very-large (4-m) aperture (*ops.* ~ 2018+)
 - Huge data producer: *0.5-3 PB/day*
 - In the meantime, development/implementation of VO tools for the so-called *heliophysics*
- **Participation to MUSE@VLT datacenter(s)**
 - 3D-spectroscopy, *ops.* ~ 2012-13
 - Simulated data cubes soon to be available
 - *Adequate DM yet?*
- **Interop. synthetic + obs. spectra DBs**
 - **Stellar physics:** magnetism, activity etc.
 - Extension to Espadons@CFHT data



SDM-SSAP-VOSpec

- **OV-compliant stellar spectropolarimetry DB**
 - TBL 2-m telescope (Pic du Midi)
 - *Narval* spectropolarimeter
 - Basic products: $[\lambda, I(\lambda)]$ or *normalized* $[\lambda, I(\lambda)/I_{\text{continuum}}]$
 - But also *Stokes parameters* $\neq I$, mainly: $V(\lambda)/I_{\text{continuum}}$
 - VOSpec *handling*
 - ✓ « Dimensionless » flux axis (\neq “counts”)
 - ✓ Problem with multicolumn (Fits) data (and SSAP...)
 - ✓ Synthetic+normalized too (and TSAP...)
 - Should also allow to *visualize* multi-spectra (e.g., I and V)
- **What's wrong?**
 - What should be done? And by whom?

Our FITS files

- **TBLegacy database**

- Generated with PyFITS
- Following the example and recommendations in §9. (FITS serialization) of the IVOA SDM document (v1.03)
- PrimaryHDU + BinTableHDU extension
- **6-column** for polarized data: $[\lambda, I(\lambda)/I_{\text{continuum}}, V(\lambda)/I_{\text{continuum}}]$
plus [2x] “null” spectra + flux err.

VOSpec et al.

- **Interoperability synth+obs spectra databases**
 - Users would like to compare observed and synthetic data
 - « *Fits Utilities/TSAP best fit* » does not seem to work with **TBLegacy** (obs) and **Pollux** (synth.) data products
 - ✓ Change the way we have made the Fits files?
 - ✓ Requests not compliant with relevant Access Protocols?
 - ✓ Evolutions of SDM and/or VOSpec?
 - Need also for extra (but generic) tools e.g.,
 - ✓ Add ***broadening*** to synthetic spectra (instrumental, rotational)
 - ✓ ...
- **Waiting for new releases to progress further and express our needs too**

Polarization

- **Reference: feb. 3, 2010 IVOA doc**
 - Too much radio-astronomy oriented...
 - Proper documentation of (linear) polarization data
 - ✓ Document which is the « *Q>0 direction* »
 - ✓ Ability to *distinguish* between *Q* and *U*: not just rely on *total* linear polarization $p = \sqrt{(Q^2 + U^2)}/I$
 - Fractional polarization, most commonly used
 - Again « normalized » spectra, but in different ways...
 - ✓ Either $\sigma(\lambda)/I_{\text{continuum}}$, $\sigma = Q, U \text{ or } V$
 - ✓ Or $\sigma(\lambda)/I(\lambda)$ like for the so-called “*2nd solar spectrum*”
 - « Believable » quantities
 - ✓ The smaller (*polarized signal*), the better (*measurement*)
 - ✓ Can be *very* small, but still can be extracted by spectral-line multiplexing techniques (e.g., LSD)



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To conclude...

Jita-kyoei

Mutual welfare and benefit

Jigoro Kano