

Kurucz programs under intel/Linux – status report

Urtzi Jauregi
Univerza v Ljubljani

`urtzi@fmfuni-lj.si`

Outline

- The Kurucz programs.
- The case for the Intel/Linux platform.
- The Lester distribution.
- Present status
 - ATLAS
 - SYNTHÉ
- Future developments.

The Kurucz programs

- ATLAS
Model synthesis.
Low resolution spectra.
- SYNTHE
High resolution spectra.

Written in the early 70s: non-structured programming

Written for VMS on VAX/Alpha

The case for Intel/Linux and Fortran 90

- Easily available and maintainable hardware.
- Standard-conforming language.
- Modern, efficient and portable code.
- Scalability for future needs (parallellization, clustering...).

The Lester distribution

- Written by John B. Lester (U. of Toronto).
- Complete rewrite of the Kurucz suite in standard Fortran 90 with several major improvements.
- Originally it was Cray code, then ported to Sun SPARC.
- Improved handling of rotation (includes pulsation).

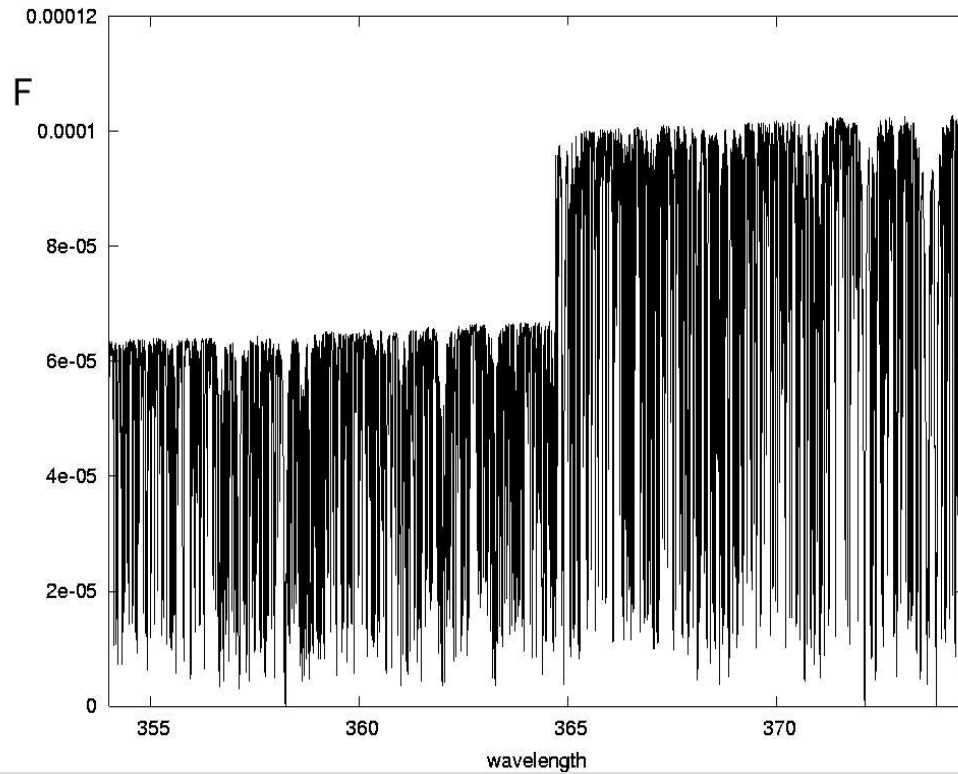
Status of ATLAS

- Model generation fully functional. Deviations from standard Kurucz models $\approx 2-3\%$
- Execution time: ≈ 23 s for a model with 72 depths in 30 iterations (35 s on VMS).
- Radiation field generation not fully functional.
- Execution time: ≈ 0.6 s for intensities at 16 angles.

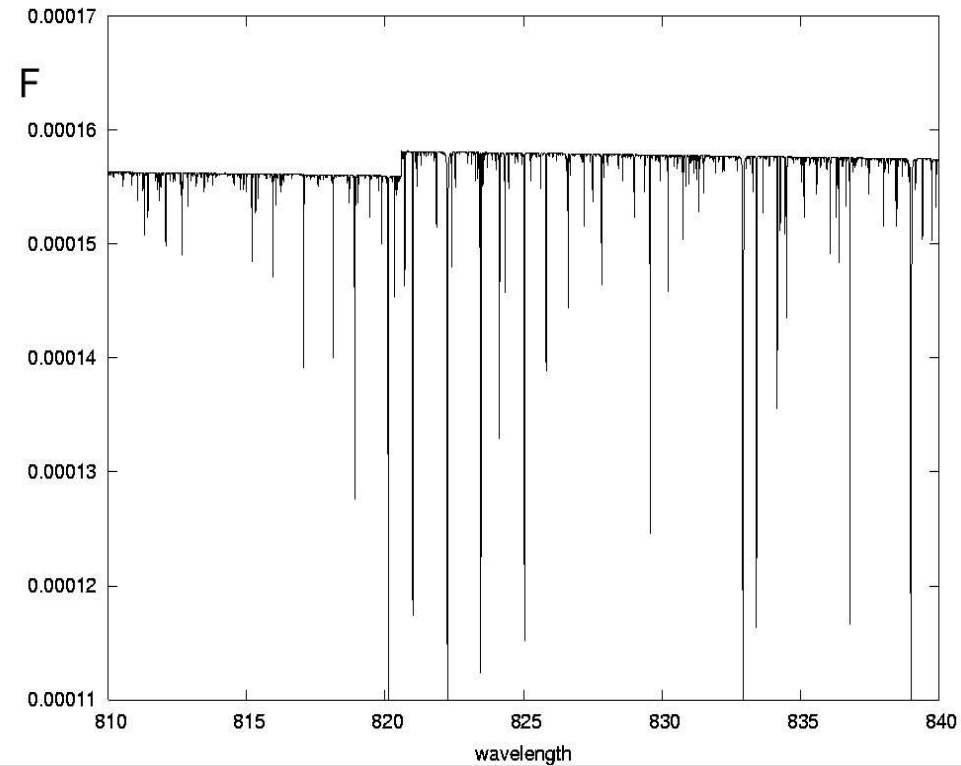
Status of SYNTHE

- Spectrum generation non-reliable (lines available: first 6 ionization stages, all molecular lines & TiO). Problems with scale of output.
- Execution time: $\approx 8-9$ min for the GAIA range at internal $\lambda/\Delta\lambda = 500000$ and 5 radial velocities (35 on VMS).

Status of SYNTHE (2)

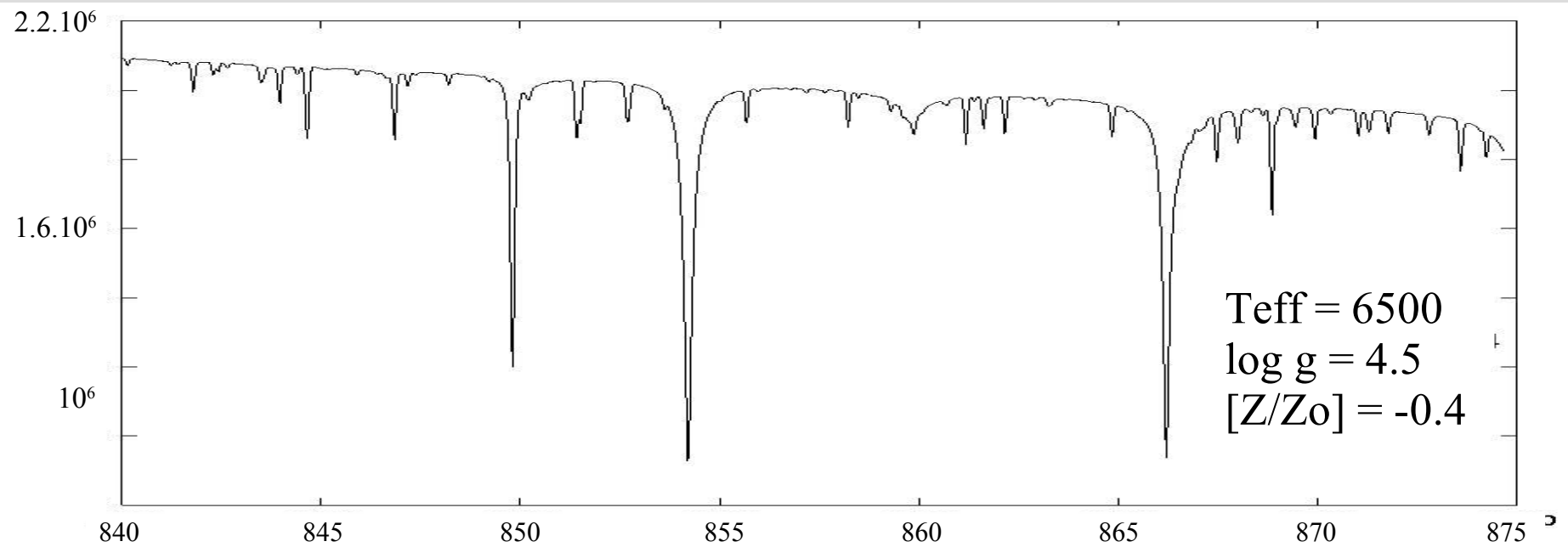
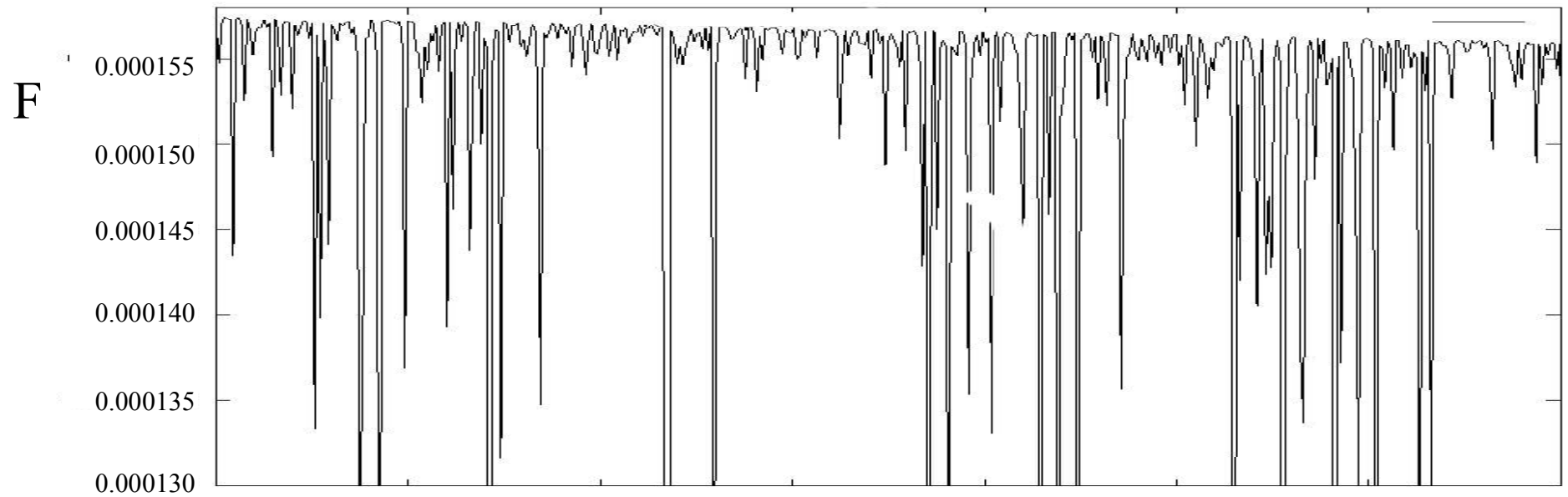


Balmer jump at 364.7 nm



Paschen jump at 820.6 nm

Status of SYNTHE (3)



Future developments

- **Functionality!!!**
- Improved handling of rotation (high speeds → non-spherical geometry).
- Include dust effects for cool stars.
- Integrate SYNTHE modules into a single program to increase efficiency (speed, hard disk usage).
- Adopt GNU Fortran 90. Parallelization...

Thanks!