Calculation of electron impact excitation cross-sections and collision strengths for non-LTE modelling

Jorge Miguel Sampaio, **Luís Leitão**, **Ricardo Ferreira da Silva**, José Pires Marques, Andreas Flörs, Gabriel Martínez-Pinedo, José Pires Marques

Ciências ULisboa
Faculdade de Ciências da Universidade de Lisboa

LIP
LABORATÓRIO DE INSTRUMENTAÇÃO E FÍSICA EXPERIMENTAL DE PARTÍCULAS

GSI

Non-LET atomic data needs

- **Electron-Impact Excitation (EIE)**
- Forbidden transitions (FT)
- Recombination (RR+DR)
- Photoionization (PI)
- Autoionization (AI)

Method

Atomic energy levels

- Optimized potential (SMBO) and calibrated energies

Electron impact cross-sections

- Distorted wave approximation

FAC

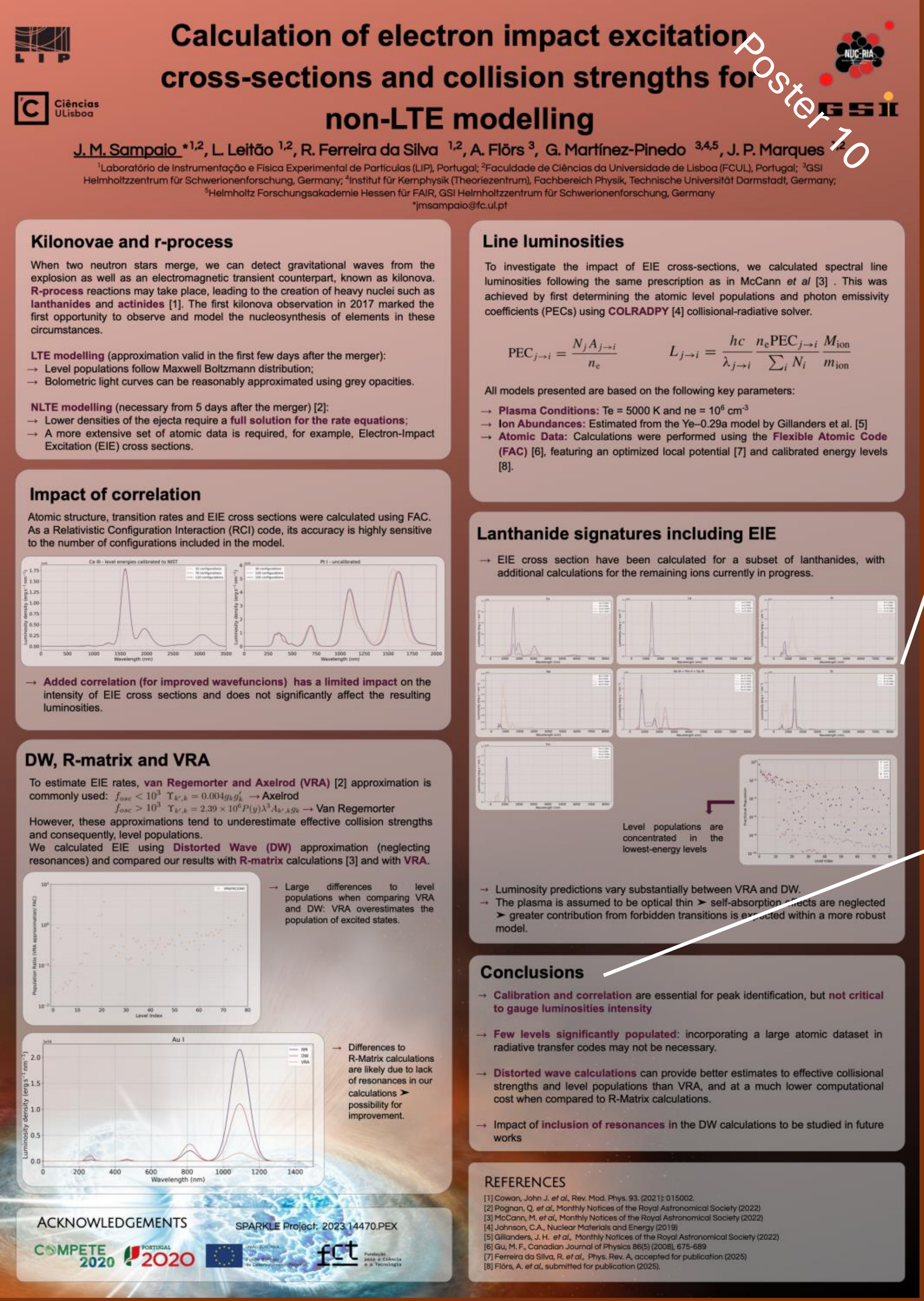
Level populations

- Optically thin plasma assumed (no reabsorption)

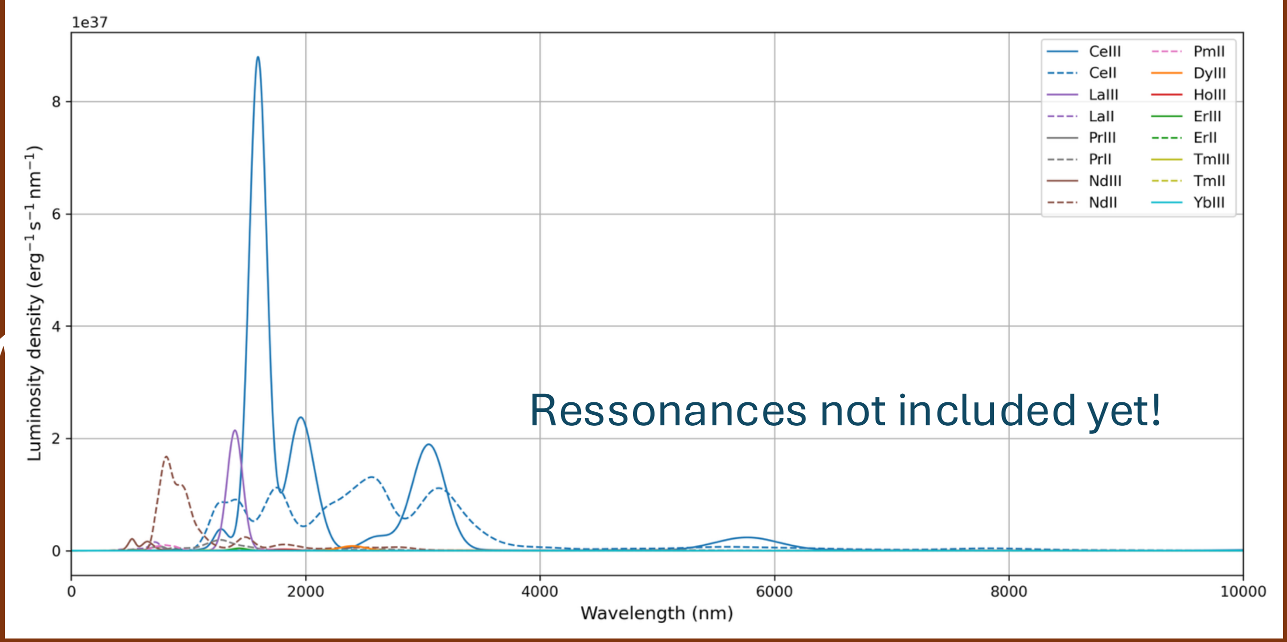
Emissivity and luminosities

- Assuming elemental masses from Gillanders

Col
Rad
Py



T=5000 K, n=10^6 cm^{-3}, M=0.05 M$_\odot$, FWHM=0.1 c



- Optimization and calibration are essential for peak identification
- Few levels are populated: datasets in radiative transfer codes can be optimized;
- DW calculations provide better results but resonences need to be incorporated.