F T3 NLTE ionization equilibrium of Nd II and Nd III in cool A and Ap stars

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NLTE analysis of Nd II and Nd III line formation was performed with the new sets of observed and calculated energy levels and transition probabilities. Calculations were made for a model with $T_{\rm eff}$=8000 K, log g=4.0, 2.0 dex Nd overabundance, which reperesents a typical cool Ap and roAp star, where a mild (Ap) and large (roAp) ionization disbalancy for Nd was derived from spectroscopy.

Full model includes 1651 energy levels (247 after combining close levels) for Nd II, 607 (67) levels for Nd III and a ground state of Nd IV. NLTE calculations were made using code DETAIL based on ALI method and developed in Munich University. Our results show that 0.5 dex ionization disagreement between Nd II and Nd III observed in cool non-pulsating Ap stars may be explained by NLTE effects, while these effects in chemically homogeneous atmosphere cannot explain 1.5 – 2.0 dex Nd anomaly observed in all roAp stars. An influence of the photoionization cross-sections on NLTE calculations is discussed.