基于神经网络求解共振俘获的发生条件

Shihong Li

Zhejiang University

Outline

Forbidden Mechanism in Spectroscopy

- **Definition:** A spectral line associated with photon absorption or emission by atomic nuclei, atoms, or molecules undergoing transitions not allowed by specific selection rules.
- **Allowed Transitions:**
  - Forbidden under usual approximations (e.g., electric dipole).
  - Allowed at higher approximation levels (e.g., magnetic dipole, electric quadrupole).
- **Transition Probabilities:**
  - Most forbidden transitions are relatively unlikely.
  - Meta-stable states have lifetimes on the order of ms to s.
  - Permitted transitions have lifetimes of less than $1\mu s$.
- **Astrophysical Forbidden Lines:**
  - Forbidden lines of nitrogen ([N II] at 654.8 and 658.4 nm), sulfur ([S II] at 671.6 and 673.1 nm), and oxygen ([O II] at 372.7 nm, [O III] at 495.9 and 500.7 nm) are observed in astrophysical plasmas.
  - The presence of [O I] and [S II] forbidden lines in T-Tauri star spectra indicates low gas density.