

EMISSION FROM COBALT IN TYPE Ia SUPERNOVAE¹

W. Liu, D. J. Jeffery, D. R. Schultz, P. Quinet,² J. Shaw,³ and M. S. Pindzola³

Nebular spectra of Type Ia supernovae are modeled by including the forbidden lines of cobalt ions for which the radiative transition probabilities and effective collision strengths have recently been calculated. As a result, the agreement between the synthetic and observed spectra is significantly improved in the early nebular phase when cobalt is as abundant as iron in the supernovae. Strong cobalt emission lines are identified in the supernova spectra, which provides a direct spectroscopic evidence for the radioactive decay of $^{56}\text{Ni} \rightarrow ^{56}\text{Co} \rightarrow ^{56}\text{Fe}$ that powers the supernovae.

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 2. Université de Mons-Hainaut, Mons, Belgium.
 3. Auburn University, Auburn, AL.