

LaO LINE LIST FOR THE $B^2\Sigma^+ - X^2\Sigma^+$ BAND SYSTEM

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LaO bands appear in the optical spectra of S-type stars. The formation of the elements can be studied by measuring the stellar abundances of heavy metals such as La. For cooler stars, the visible and near-infrared electronic transitions of LaO are more useful than La atomic lines.

We have analyzed the LaO $B^2\Sigma^+ - X^2\Sigma^+$ band system up to $v=5$ in both ground and excited states. The rotational analysis of the $B^2\Sigma^+ - X^2\Sigma^+$ transition was carried out using the PGOPHER program. Most of the ground state spectroscopic parameters and hyperfine parameters of the excited $B^2\Sigma^+$ state were taken from literature and kept fixed. The equilibrium constants for $X^2\Sigma^+$ and $B^2\Sigma^+$ states were determined. The line strengths were calculated based on the ab initio transition dipole moment and RKR potential curves. We also provide radiative lifetimes of the $B^2\Sigma^+$ state for $v=0$ to $v=4$. With this work, we provide a modern line list for the LaO $B^2\Sigma^+ - X^2\Sigma^+$ transition that can be used to simulate LaO spectra of cool S-type stars to determine La abundances.

A similar analysis is in progress for the LaO $A^2\Pi - X^2\Sigma^+$ transition.