

# Bound-bound transitions in the emission spectra of Ba<sup>+</sup>-He excimer

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## Abstract

© 2016 American Physical Society. We present an experimental and theoretical study of the emission and absorption spectra of the Ba<sup>+</sup> ions and Ba<sup>+</sup>\*He excimer quasimolecules in the cryogenic Ba-He plasma. We observe several spectral features in the emission spectrum, which we assign to the electronic transitions between bound states of the excimer correlating to the 6<sup>2</sup>P<sub>3/2</sub> and 5<sup>2</sup>D<sub>3/2,5/2</sub> states of Ba<sup>+</sup>. The resulting Ba<sup>+</sup>(5<sup>2</sup>D<sub>J</sub>)He is a metastable electronically excited complex with orbital angular momentum L=2, thus expanding the family of known metal-helium quasimolecules. It might be suitable for high-resolution spectroscopic studies and for the search for new polyatomic exciplex structures.

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