

# PFI-ZEKE PHOTOELECTRON SPECTROSCOPY OF METASTABLE He<sub>2</sub>: IONIZATION POTENTIAL AND ROVIBRATIONAL STRUCTURE OF He<sub>2</sub><sup>+</sup>

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A supersonic beam of metastable He\* atoms and He<sub>2</sub>\* a <sup>3</sup>Σ<sub>u</sub><sup>+</sup> molecules has been generated using a pulsed discharge at the exit of a pulsed valve prior to the gas expansion into vacuum. Pulsed-field-ionization zero-kinetic-energy (PFI-ZEKE) photoelectron spectra of the He<sub>2</sub><sup>+</sup> X<sup>+</sup> <sup>2</sup>Σ<sub>u</sub><sup>+</sup> (v<sup>+</sup> = 0 – 2) ← He<sub>2</sub>\* a <sup>3</sup>Σ<sub>u</sub><sup>+</sup> (v'' = 0 – 2) transitions and photoionization spectra of He<sub>2</sub>\* in the vicinity of the lowest ionization thresholds have been recorded. The energy level structures of <sup>4</sup>He<sub>2</sub><sup>+</sup> X<sup>+</sup> <sup>2</sup>Σ<sub>u</sub><sup>+</sup> (v<sup>+</sup> ≤ 2, N<sup>+</sup> ≤ 23) and <sup>3</sup>He<sub>2</sub><sup>+</sup> X<sup>+</sup> <sup>2</sup>Σ<sub>u</sub><sup>+</sup> (v<sup>+</sup> = 0, N<sup>+</sup> ≤ 11) have been determined, and an accurate set of molecular constants for all isotopomers of He<sub>2</sub><sup>+</sup> has been derived in a global analysis of all spectroscopic data reported to date on the low vibrational levels of He<sub>2</sub><sup>+</sup>.<sup>b</sup> The analysis of the photoionization spectrum by multichannel quantum defect theory has provided a set of parameters describing the threshold photoionization dynamics of He<sub>2</sub>\* a <sup>3</sup>Σ<sub>u</sub><sup>+</sup>.

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