A high-resolution database for the vibration-rotation spectrum of acetylene (0 – 8022 cm^{-1})

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We have built an effective Hamiltonian capable of reproducing all published vibration-rotation lines in $^{12}C_2H_2$ accessing levels up to 8900 cm^{-1}, within three times their stated experimental standard deviation [1]. It was applied to predict IVR dynamics including rotational degrees of freedom [2] and to calculate partition function and other thermodynamical quantities up to 2,000 K with previously unmatched accuracy [3]. We have now exploited the predictive power of this Hamiltonian to build a database providing line positions and intensities for $^{12}C_2H_2$ from the FIR (ν_5-ν_4) through the MIR (ν_5, $\nu_4+\nu_5$, $\nu_2-\nu_5$, ν_3) to the NIR ($\nu_1+\nu_3$) spectral ranges. The $^{12}C_2H_2$ database, named FASE for Femto-, Astro-, Spectro-Ethyne, will be presented and discussed.

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