

Abstract Submitted
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Weakly bound molecular ions with giant electric dipole moment and polarizability MICHAL TOMZA, Univ of Warsaw, KRZYSZTOF JACHYMSKI, Univ of Stuttgart — We investigate molecular ions in weakly bound rovibrational states and show that they have a giant permanent electric dipole moment with a value up to 1000 Debye and a giant electric dipole polarizability with a value up to $10^{15} a_0^3$. Using quantum defect theory we derive analytic expressions for these properties as functions of binding energy. We show that the electric properties and radiative lifetimes of weakly bound molecular ions can be controlled with a magnetic field via magnetically tunable Feshbach resonances, whereas the magnetic properties can be controlled with a laser-induced Stark effect. Thus, these systems constitute an interesting example with a controllable interplay between electric and magnetic interactions. We analyze practical implications of our findings and propose new ultracold precision measurement experiments to access the unusual properties of the investigated systems.

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