Permanent electric dipole moments (EDMs) of particles and nuclei are among the most sensitive probes for time-reversal symmetry violation, which is necessary to explain the relative abundance of matter over antimatter in the macroscopic universe. The latest experiments using precision spectroscopy of diatomic molecules provides more stringent constraints on the masses of new particles than the Large Hadron Collider. I will describe an ongoing search for the electron EDM at JILA using trapped Hafnium Fluoride molecular ions, including our first results, our plans for an order of magnitude improvement in our second generation experiment, and our vision for further improvements in a third generation experiment.