According to Hund’s rules, the lowest energy exciton in organic materials is a poorly emitting triplet state. For inorganic semiconductors, similar rules predict an analog of this triplet known as the dark exciton. Because this state releases photons slowly, materials that disobey these rules have been sought. However, despite considerable experimental and theoretical efforts, no inorganic semiconductors have been identified in which the lowest exciton is bright. Here, we will discuss the situation in cesium lead halide perovskites [CsPbX$_3$ (X = Cl, Br, and I)]. Theory shows that this material can exhibit a highly emissive triplet state when the strong spin–orbit coupling in the perovskite conduction band is combined with the Rashba effect.$^1$ We then apply such a model to CsPbX$_3$ nanocrystals, for which we measure size- and composition-dependent fluorescence at the single-nanocrystal level. The bright-triplet character of the lowest exciton immediately explains the anomalous photon-emission rates of these materials, which emit ~20 and ~1,000 times faster than any other semiconductor nanocrystal at room and cryogenic temperatures, respectively. The bright-triplet exciton is further confirmed by detailed analysis of the fine structure in low-temperature fluorescence spectra. Our results provide criteria for identifying other semiconductors that exhibit bright excitons, with potential implications for optoelectronic devices and quantum emitters.