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Magnetic Resonances at Short Distances HORACE CRATER, The University of Tennessee Space Institute, CHEUK-YIN WONG, Oak Ridge National Laboratory — The magnetic interaction at short distances between two opposite electric or color charges in the ${}^3P_0$ state ($J = 0, L = 1, S = 1, P = 1$ and $C = 1$) is very attractive and can overwhelm the centrifugal barrier at short distances (of about 10^{-2}-10^{-3} fermis), with a barrier between the short-distance region and the long-distance region. In the two body Dirac equations formulated in constraint dynamics, the short-distance attraction for this ${}^3P_0$ state admits a peculiar solution for the radial part of the relative wave function $u = r\psi$ that grows with distance as $r^{(1-\sqrt{1-4\alpha^2})/2}$, in addition to the usual solution that behaves as $r^{(1+\sqrt{1-4\alpha^2})/2}$. Both solutions have admissible behaviors at short distances and the usual solution leads to no resonant behavior. However, for the peculiar solution we find a resonance at about 28 MeV for e^+e^- and a width of about 15 KeV.

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