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Relativistic Studies of the Charmonium and Bottomonium Meson Systems Using the Sucher Equation CHARLES WERNETH, The University of Tennessee, KHIN MAUNG MAUNG, The University of Southern Mississippi — The bound states of quarks and anti-quarks (mesons) are studied with a relativistic equation known as the Sucher equation. Prior to this research, meson mass spectra had not been studied with the Sucher equation. Moreover, a full angular momentum analysis of the Sucher equation had not been investigated. The Sucher equation is equivalent to the Schrödinger equation with relativistic kinematics and a spin-dependent effective potential. Through a complete general angular momentum analysis, we find that angular momenta can couple through the effective potential without explicitly including the tensor interaction. We predict the charmonium and bottomonium mass spectra using the Sucher equation. We find that the Sucher equation may be used for the charmonium and bottomonium meson systems, but the inherent spin-dependent effective potential fails to produce the proper energy level splitting between singlet and triplet states.

Charles Werneth
The University of Tennessee

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