

Abstract Submitted  
for the OSS05 Meeting of  
The American Physical Society

**Fano quadrupole resonance in an Aharonov-Bohm ring** ERIC HEDIN, ARKADY SATANIN, YONG JOE, Department of Physics and Astronomy, Ball State University, Muncie, IN 47306 — We examine new effects arising from the collision of Fano dipoles seen in the transmission through an Aharonov-Bohm (AB) ring. An exact solvable model is developed in which the effect of coupling between two quantum dots in one arm of the AB ring is studied. A detailed investigation of the collision of Fano dipole resonances and the formation of a unique coupled object called a Fano quadrupole is carried out. The behavior of the zeros and poles of the transmission amplitude as a function of magnetic field through the ring is investigated. To control the transmission zeros and resonances, the coupling between the quantum dots is varied. It is shown that in the weak coupling regime, the zeros of the transmission amplitude independently orbit their respective poles in the complex energy plane as a function of magnetic flux. In the strong coupling regime, the zeros are shown to move in a common orbit around both poles, indicating the formation of the coupled Fano quadrupole. We briefly discuss possible applications of these effects for the realization of a quantum transistor and the use of nano-devices for quantum computing. \*Supported by the Indiana 21st Century Research and Technology Fund

Yong Joe

Date submitted: 15 Mar 2005

Electronic form version 1.4