1098-34-126 **Tracy Weyand*** (tweyand@math.tamu.edu) and **Gregory Berkolaiko**. *Stability of Eigenvalues of Quantum Graphs with Respect to Magnetic Perturbation.*

We consider the eigenvalues of the magnetic Schrödinger operator on a quantum graph as functions of the magnetic potential. We establish a simple relation between the Morse index of the magnetic eigenvalue and the number of zeros of the corresponding non-magnetic eigenfunction. This highlights an intricate relationship between the zeros of an eigenfunction and the stability of the corresponding eigenvalue under magnetic perturbation.

In particular, let $\{\sigma_j\}_{j=1}^{\beta}$ be a set of generators of the fundamental group of a quantum graph Γ. The eigenvalues of the magnetic Schrödinger operator may be considered as functions of the magnetic flux $\boldsymbol{\alpha} = (\alpha_1, \ldots, \alpha_\beta)$ where $A(x)$ is the magnetic potential on Γ and

$$\alpha_i = \oint_{\sigma_j} A(x)\, dx.$$

Let ψ be the n-th eigenfunction of the ordinary Schrödinger operator (no magnetic potential) and let ϕ denote the number of zeros of ψ on Γ. We demonstrate that $\boldsymbol{\alpha} = (0, \ldots, 0)$ is a non-degenerate critical point of $\lambda_n(\boldsymbol{\alpha})$ with Morse index equal to the nodal surplus of ψ, which is $\phi - (n-1)$. (Received January 26, 2014)