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**Tunneling anisotropic magnetoresistance in Ni break junctions** J. D. BURTON, E. Y. TSYMBAL, University of Nebraska Lincoln, O. N. MRYASOV, Seagate Research — Anisotropic magnetoresistance (AMR) is the difference in resistance as the magnetization direction is changed with respect to the direction of current flow. We will present results of first-principles calculations of AMR in Ni nanowires. It is known that in the ballistic regime the conductance of a magnetic nanowire changes in steps of $e^2/h$ as the angle of the magnetization changes with respect to the axis of the wire.[1] This ballistic AMR (BAMR) effect originates from the spin-orbit coupling which can change the number of bands crossing the Fermi energy ( $E_F$ ) as the magnetization direction is changed. We extend this consideration to the case of a break junction, where transport occurs via tunneling. We find a significant dependence of the tunneling conductance on the magnetization direction, an effect known as tunneling AMR (TAMR). We find that states localized at the electrode tips near the break are broadened by the spin-orbit interaction and contribute significantly to the tunneling. The position with respect to $E_F$ and broadening of these states depend strongly on the orientation of magnetization. Our results bear a striking resemblance to recent experimental results [2], clearly indicating an origin different from the one proposed previously.[2] This work is supported by Seagate Research and Nebraska NSF-MRSEC. [1] J. Velev et al. PRL **94**, 127203 (2005), [2] K. Bolotin et al. PRL **97**, 127202 (2006).

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