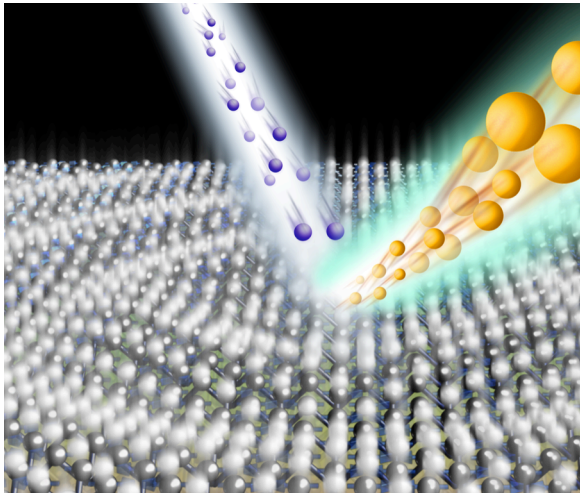


Marriage of spin and lattice by the minister of charge

Traditionally the coupling of the electrons to the lattice in a material is treated using the Adiabatic Approximation (1927 Born-Oppenheimer approximation), which assumes the electrons will always be in a ground state configuration independent of the position of the atoms. It is also true that there is no way for the spin in a solid to directly couple to the lattice or lattice dynamics. The breakdown of the Born-Oppenheimer approximation is seen in many materials as Electron-Phonon coupling and is responsible for many physical properties, such as superconductivity. A research team from the department of Physics and Astronomy at LSU has recently reported in *Proceedings of the National Academy of Sciences*



(PNAS, **110**, 898 (2013)) the observation of extremely large spin-charge-lattice coupling driven by the broken symmetry present at the surface. The study was conducted on single crystals grown at LSU of the newly discovered Fe-based superconductors $\text{Ba}(\text{Fe}_{1-x}\text{Co}_x)_2\text{As}_2$, using high resolution inelastic electron scattering to probe the lattice dynamics (see picture).