Azobenzene is a ubiquitous chromophore in biological and materials chemistry. The reversible cis-trans photoisomerization occurs with little degradation and effects a large dipole moment and molecular shape change. Substitution is used to alter photoisomerization kinetics and incorporation into hybrid systems. We will present results on photoinduced changes in DNA and peptide hybrids. Cis-azobenzene with at least one ortho-fluorine on each aromatic ring exhibits through-space spin coupling in the {1H}19F NMR spectrum. We have investigated this nonbonded interaction using density functional theory, crystallography and multinuclear NMR. We have developed a model for a conformational structural manifold that provides a qualitative explanation of NMR data.

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