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Coupling of Photonic and Electronic Spin Catalyzed by Diatomic Molecules[1]

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Recent experiments involving the collisions of polarized photons or polarized electrons with simple diatomic molecules have shown novel ways in which the net spin of electrons can be converted into the net spin of photons following the collisions, or vice versa. I will discuss three recent experiments that illustrate such transformations: the production of nuclear rotational spin in nitrogen molecules excited by polarized electrons with the subsequent emission of polarized photons [1], the excitation by polarized electrons of rotational eigenstates of hydrogen molecules and the subsequent emission of circularly-polarized light [2], and the photolysis of hydrogen molecules by circularly-polarized light yielding photofragments that "spin the wrong way." To our knowledge, these latter measurements represent the first observation of photofragment orientation by direct observation of the polarization of the photofragment fluoresence.

[1] J.W.Maseberg and T.J.Gay, PRA **79**, 022705
[2] J.W.Maseberg and T.J.Gay, J.Phys.Conf.Ser.**212**, 01221

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[2]Work done in collaboration with J.W. Maseberg, J.E. Furst, J.H. Machacek, K.W. McLaughlin, A.L.D. Kilcoyne, F. Martin, and J. Fernandez.