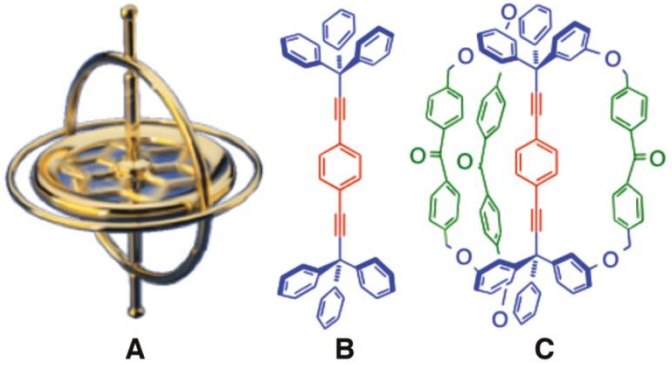


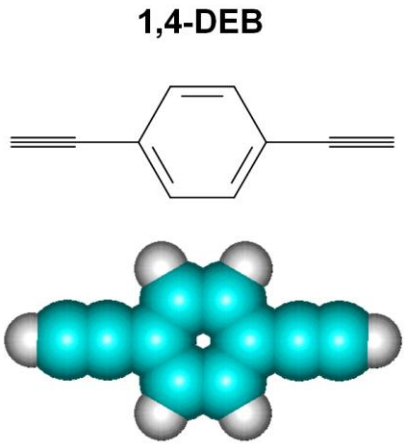
Figure 1. (a) A macroscopic toy gyroscope is assembled with a rotating mass (rotator) that is linked to a stator made by two circles that enclose the rotator. (b) A molecular gyroscope with an open topology consists of a phenylene rotator (red) and two trityl stators in blue, and (c) a molecular gyroscope with a closed topology consists of a phenylene rotator, two trityl stators, and three benzophenone bridges.

Project Proposal, Spring 2013:

Molecular Machines: Spectroscopic investigation of the ”molecular rotorblade” 1,4-diethynylbenzene (1,4-DEB)

Nature is abundant with fantastic molecular machines, just think of molecular biological systems like proteins, DNA, virus, etc. For many years it has been the dream of chemists to design artificial machines that imitate the ability of natural machines to generate a controlled motion at the molecular level. But this has proven a difficult task. For example, the synthesis of an apparently simple functional unit like a *molecular wheel* has turned out to be a considerable challenge. Synthetic chemists currently attempt to incorporate an 1,4-diethynylbenzene (1,4-DEB) fragment as a molecular rotor, for example in *molecular gyroscopes*, see the box [1].

The aim of the proposed project is to obtain an overview of recent efforts to construct molecular machines, combined with a spectroscopic investigation of the ”rotorblade” 1,4-DEB. A detailed investigation of the UV spectrum of 1,4-DEB has apparently not been published. The idea is to investigate the compound with polarization spectroscopic methods [2] which yield information on directional properties that may be of importance in the study of the molecule as a ”rotor”.



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