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Capabilities of single-crystal neutron diffraction: a summary and a discussion of future potential.

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The various capabilities of single crystal neutron diffraction are presented in this introductory talk. In brief, the technique is currently being used for (1) accurately locating the positions of light atoms (in most cases hydrogen) in molecules when they are surrounded by much heavier atoms (for example, H atoms in metal cluster complexes); (2) distinguishing between certain isotopes (most notably H from D), and (3) studies of magnetic structure. In some cases, examples from the author's own work will be presented to illustrate the usefulness of the technique. Advantages as well as disadvantages of single-crystal neutron diffraction will be discussed, and future directions will be prominently featured: in particular, new facilities will be described which are intended to markedly reduce (a) crystal size and/or (b) data collection times. Finally, we will mention very briefly exciting new developments in the applications of this technique to macromolecular structure, which will be elaborated in more detail by subsequent speakers in this Transactions Symposium.