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Establishing the limitations of photoexcited muon spin spectroscopy

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Crystalline silicon is used for >90% of photovoltaic solar cells. Electron-hole pairs are produced when light of certain frequencies is absorbed. Some of these charge carriers are lost due to recombination processes in the silicon before they are collected, and the lifetime (or diffusion length) of the carriers defines the quality of a silicon wafer. Photoexcited muon spin spectroscopy (photo- μ SR), developed at ISIS, is a means to measure depth-dependent excess charge carrier density –distinguishing surface- and bulk- recombination of charge carriers. Our objective is to further develop the photo- μ SR approach by defining the range and upper limits of surface recombination velocities distinguishable.

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