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Probing nucleon's spin structures with polarized Drell-Yan in the Fermilab E1039 experiment

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Although the proton was discovered about 100 years ago, its spin structure still remains a mystery. Recent studies suggest that the orbital angular momentum of sea antiquarks could significantly contribute to the proton's spin. The SeaQuest experiment, which recently completed data collection, probed the unpolarized light sea antiquark distributions of the proton using the Drell-Yan process. Its successor, the Polarized SeaQuest experiment (E1039), will access the u_bar and d_bar Sivers functions using polarized NH3 and ND3 targets. A non-zero Sivers asymmetry will be a strong indication of non-zero orbital angular momentum. The experiment can also probe the sea quark's transversity distribution, which is relevant for the determination of proton's tensor charge. The current status and future plans of the experiment will be presented.

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