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PICASSO Experiment

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The PICASSO experiment is a dark matter experiment based at SNOLAB, Sudbury (Ontario). It searches for spin dependent interactions of Weakly Interacting Massive Particles (WIMP) on  $^{19}\text{F}$ . It uses superheated liquid perfluorobutane ( $\text{C}_4\text{F}_{10}$ ) as its active detector component. The superheated  $\text{C}_4\text{F}_{10}$  is dispersed in the form of droplets in an elastic polymer and each droplet acts as tiny, individual bubble chambers. The detector is now complete and has a  $^{19}\text{F}$  target mass of 1.80 kg. When a WIMP hits a  $\text{C}_4\text{F}_{10}$  droplet, the recoiling nucleus creates a heat spike which causes the liquid to vaporize forming a small bubble along its track. This bubble grows explosively until the entire droplet is transformed into vapour. Piezo electric sensors attached to the detector wall register the accompanying acoustic signal. PICASSO has recently discovered that these signals contain information about the very nature of the primary event and therefore can be used to discriminate efficiently between WIMP signals, alpha particles and non-particle induced background sources. In this talk we will discuss this new separation technique and present the current best limits on the WIMP-proton cross section in the spin dependent sector. With only two of the 32 detectors analyzed, a limit on the WIMP-proton cross section of  $\sigma_{\text{p}} = 0.16\text{pb}$  (90% C.L.) has been obtained, restricting recent interpretations of the DAMA/LIBRA annual modulations. The results have been submitted to Phys. Lett. B.