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We have been searching for the direct interactions of dark matter in sub-terrestrial detectors for over 30 years. We have tested and ruled out many possible particle physics models. I will discuss why we are still looking for these elusive particles.

Also, a wide range of techniques has also been employed in order to establish convincing evidence for these interactions. I have worked on five of them during this period, and I will discuss many of the technological breakthroughs we have made in this quest. In the early-experimental stages of our searches interaction rates of 1000’s per kg of detector per day were explored. Today we are looking for dark matter events that are as rare as 1 per kg per century. We carry this out with detectors that have active masses that are at the tonne-scale, but yet they can be sensitive to particle interactions with energies of less than 1 keV.

I will include a discussion of the LUX ZEPLIN (LZ) Experiment which will have a world-leading sensitivity in the search for WIMPs (weakly interacting massive particles). LZ is a 10-tonne active liquid Xe time projection chamber, is in final stages of construction and will be operated underground at the Sanford Underground Research Facility, SD. I will also look at the future of the field beyond this immediate stage.