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Ultra low background DEAP-3600 detector: Is the secret ingredient Acrylic?[1] PIERRE GOREL, SNOLAB, DEAP COLLABORATION — DEAP-3600 is a ton scale single-phase liquid argon detector operating 2 km underground at SNOLAB (Canada), and looking for WIMP with a mass higher than 100 GeV. Relying on the so-called argon scintillation pulse-shape discrimination to distinguish the electromagnetic background from the nuclear recoil signal, it has been designed as a background-free detector in the region of interest for 3 years of data. It has been taking data for over a year, and the first results have been published during the summer 2017. While the background-free goal cannot yet be demonstrated, it is already clear that DEAP-3600 achieved remarkably low levels of backgrounds. In particular, the ^{222}Rn contamination in the liquid argon was measured to be of the level of 0.2 μBq/kg, significantly better than the best liquid Xenon detector. It is thanks in part to the use of acrylic for the detector vessel, a premiere for a cryostat. But acrylic alone would not have been enough. In this talk, I will present all the steps that have been needed to achieve these low background levels, from the material choices and assays to the surface treatments during construction and argon purification techniques.

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