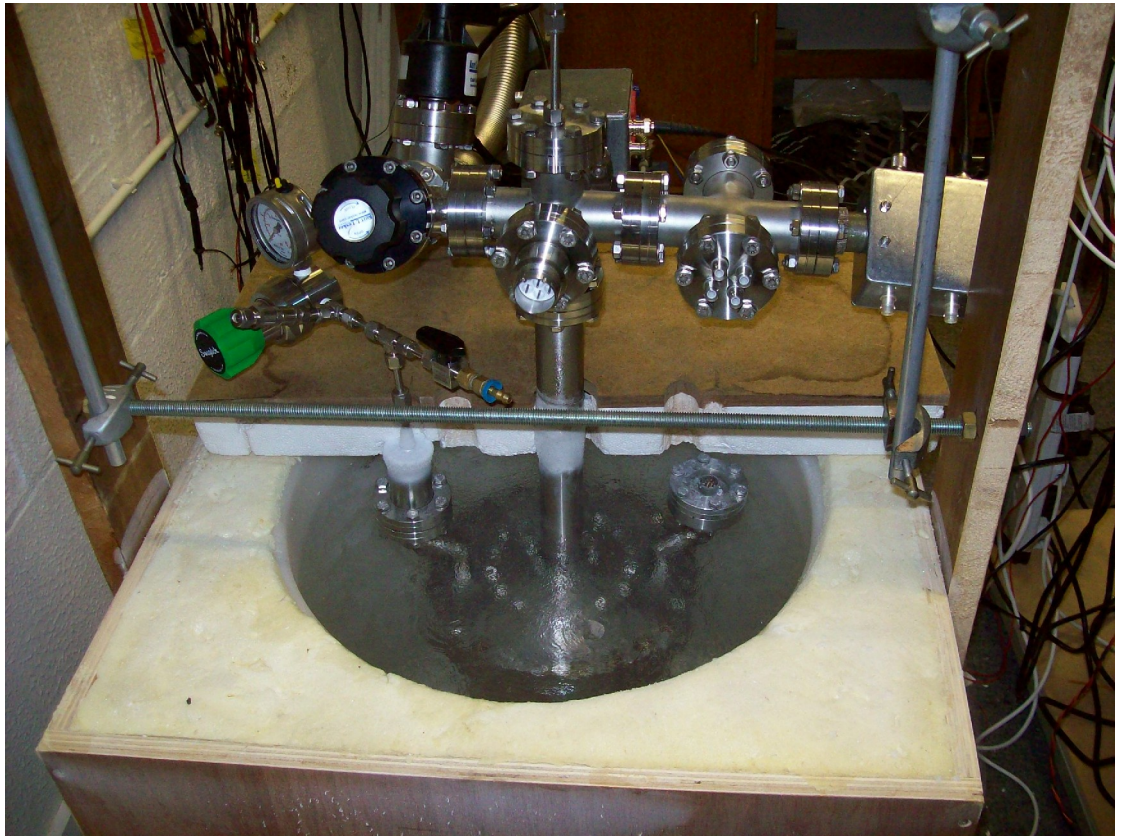
Liquid Scintillator TPC Workshop

Meeting Rationale

Y. Ramachers

LAr vs LScint

£15000,-



£150,-

THE UNIVERSITY OF WARWICK

A little more considered view

Property	Liquid argon	Liquid scintillator
Charge and light output	Yes	Yes (charge new on select liquids)
Charge drift speed	2mm / μs @ 1kV/cm	0.1mm / μs @ 7kV/cm
Electron lifetime	3ms->4m track @ 0.1ppb (Argontube)	???: Max. 5cm drift so far
Fluorescence emission	128 nm	Peak @ about 360nm
Charge-pair W-value	23.6 eV	??? 30-40 eV
Fano factor	0.107	???
Cross sections e- transport	Known	Unknown
Energy resolution (sum charge + light)	?: 0.5% @ 662keV intrinsic	?
...		
Risk:	Low/Mature tech	High

Strategy Question: Is it worth trying to swap?

Pro

- Two main Physics applications:
  - Double-beta decay
  - Huge multi-purpose neutrino detector
- Costs of a big detector
- Practical advantages on all levels

Con

- Risk:
  Might simply not work well enough
- Too late: no use case compared to existing solutions

Warwick detector development group: As it stands, it is worth pursuing this line of research. Convincing the community to adopt this technology needs a lot more work to be done, hence seek a collaboration and funding.