
Date: Sat, 28 Jan 2006 11:19:12 -0500
From: Kirk T McDonald <kirkmcd@Princeton.EDU>
To: John Learned <jgl@phys.hawaii.edu>
Subject: Herb Chen and liquid argon in 1978

John,

In 1978 Herb Chen, John Lathrop and you put out a couple of papers on long drift liquid argon.

http://puhep1.princeton.edu/~mcdonald/examples/detectors/chen_nim_150_585_78.pdf
http://puhep1.princeton.edu/~mcdonald/examples/detectors/chen_ieeetns_25_358_78.pdf

The Nim paper claimed that a device of several tons would soon be built. What became of that effort?

Thanks,

--Kirk

I suppose that some of this has to do with the historical origin of the notion of long drift liquid argon TPCs

Rubbia's preprint is dated 17 May 1977

http://puhep1.princeton.edu/~mcdonald/examples/detectors/rubbia_cern_77-08.pdf

He claims that John Losecco and Alan Sessoms were working on a device at Harvard in 1977.

In the both of the Chen et al papers, you claim that a drift of 75 mm had been achieved already in April 1977.

Since short drift liquid argon was a hot topic for calorimetry in those days, it may be that various people thought to look into longer drifts. What do you recall of the spirit of those times?

----- Original Message -----

From: "John G. Learned" <jgl@phys.hawaii.edu>
To: "Kirk T McDonald" <kirkmcd@Princeton.EDU>
Sent: Saturday, January 28, 2006 1:47 PM
Subject: Re: Herb Chen and liquid argon in 1978

Hi Kirk:

Yes, sure I recall the episode very well. I was at UCI and thinking of new directions, and decided to work with Herb on this effort. John Lathrop was one of Reines' gang, old warhorses who could get things done. Herb was young and ambitious, a converted theorist and very full of himself, hard working and full of ideas. Herb had decided he wanted to do solar neutrino counting and various neutrino experiments, and was exploring various methods to do so. In the course of this one route was working towards liquid argon, with the explicit intent of making a large Icarus-like detector. I do not know whose idea an icarus-like detector was initially, but it was in the air and talked about by various folks, including some at Berkeley.

Actually Herb was rather difficult to work with as a peer, as he had to have all the ideas and was a micro-manager, so I did not continue to work with him. It was friendly, but I had other things to do in that DUMAND was stirring up and we beat out Rubbia and company in the IMB proposal as well as in LAr drifting (they built the failure in the mine in Utah).

This brings up an amusing event. One of our colleagues, I forget who, was stopping by Haravrd and we asked them to look in on the competing attempt that Rubbia's folks were said to be carrying out. The visitor asked to see the apparatus and it could not be found. Yet Carlo was saying that they too had drifted some long distances of tens of cm. We came to believe that the Harvard LAr drifting effort was all smoke.

Anyway, Herb continued to build up his effort and assembled a very good team to do this, under the wing of Reines, but with Herb becoming more and more independent (with Fred's blessing). One of these was Peter Doe, but I forget the names of the other two or three post-docs. Peter is now at U. Wash. Seattle if you want to ask him about this era. Anyway, Lathrop had retired and in my recollection it was Peter Doe who worked out many of the now standard lore about how not to pollute LAr and how to filter it.

Our initial device was quite small.... a few liters. We drifted only a few cm, but measured and attenuation length of (if I recall correctly) 30cm. It gave us confidence that we could build a larger detector and achieve a few meter attenuation length. Peter went on to some rather larger devices... would have to look it up, but I think of order of a cubic meter. Ask Peter.

Meanwhile, Cline-Rubbia went their way and started building devices at CERN. I had moved to Hawaii to start DUMAND when Herb became ill. After he died UCI decided not to hire someone to continue his program, which by

that time included SNO, which everyone acknowledges was Herb's idea and he began the initiative in Canada with the heavy water. Herb's post-docs scattered to the four winds... I think all but Peter Doe went off to industry. (This was a really foolish move on the part of UCI, but there were people there who really hated Fred and tried to harm the neutrino group at every opportunity.) I believe that if Herb had lived we would have had an Icarus-like detector long ago.

What, BTW, if your interest in this history?

Regards. Ciao,

John

From: [Kirk T McDonald](#)
To: [Peter Doe](#)
Sent: Sunday, January 29, 2006 11:33 AM
Subject: Liquid argon

John Learned suggested that I might contact you, in that you are one of the pioneers in the development of liquid argon detectors with long drifts.

I would be interested in your perspective on this activity, then and now.

A smallish group of us is trying to revive liquid argon development in the USA for long-baseline neutrino oscillation physics. Should you have any interest in this, we would be delighted to discuss it further with you.

A short blurb on some of our hopes and plans is at
<http://www.hep.princeton.edu/~mcdonald/nufact/LArInitiative.pdf>

Best wishes,

--Kirk McDonald
Professor of Physics

----- Original Message -----

From: [Peter Doe](#)
To: [Kirk T McDonald](#) ; [Peter Doe](#)
Sent: Monday, January 30, 2006 5:23 PM
Subject: Re: Liquid argon

Hi Kirk,

John Learned has a good memory! I was among the early workers investigating long distance drifting in LAr...but for the past 15 years I've been sidetracked by heavy water and SNO.

I remain enthusiastic about LAr. It appears that the main technical problems (long distance drifting, purification in the liquid state, massive wire planes at cryogenic temperatures, affordable low-noise electronics...) have all been resolved. It would be nice to find a large, solid state light detector, good for 129 nm, to replace the PMT. The potential of LAr detectors continues to evolve with such developments as particle ID from the time structure of the scintillation light being used in WARP and DEEP to suppress backgrounds.

Perhaps a significant hurdle for reactor and solar applications could be the safety issues of large underground detectors. I suspect the technology and precedence to address this is out there (LNG storage underground).

I'm moderately involved again with LAr, using it as a Compton veto around Germanium crystals in a neutrinoless double beta decay experiment (a great idea, unfortunately not mine...it came from Gert Heuesser and Steffan Shonert at MPIK). This and being project manager for the US KATRIN tritium beta decay experiment mean that I could not find the cycles to usefully contribute to another LAr program - a pity.

A couple of years ago Adam Para (Fermilab) had formed a very active argon group with the aim of building the next generation large detectors - have you tried contacting him?

Good luck with your program - after all the effort that has gone into making it a reality, I would dearly like to see a solid physics result coming from this powerful detector technology.

Best wishes,

Peter.

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