Final remarks – do we need a Global Universal Aging Research & Development (GUARD) facility ?

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Abstract

A small new research facility dedicated to aging studies for gaseous detectors is proposed with the goal of overcoming current shortcomings in this research area. The general framework and a possible path towards such a facility are outlined.

Key words: infrastructure, test beams, long-term tests, collaboration

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1 Introduction

At the end of this successful workshop, after enjoying many presentations that have surveyed today's status of research on aging phenomena in gaseous detectors, it is well-advised to look to the future of this particular research area, especially since a dedicated topical workshop on aging does not appear to occur very often.

In these final remarks, I would like to propose to interested researchers who work on gaseous detectors to collaborate on the creation of a "Global Universal Aging Research & Development" facility, or "GUARD" facility for short, as one possible avenue to help propel research on gaseous detectors into the future. Such a facility would address a crucial problem that researchers face when they encounter unexpected aging phenomena in their brand-new prototype or production detectors or want to do systematic studies: Where to conduct a meaningful long-term aging study in an efficient way that will point to a solution of the particular aging problem ?

Currently, in such a situation each research group will typically set out by themselves to re-create the infrastructure that is necessary for the test, such as identifying and getting access to an appropriate irradiation source, constructing a gas system with more or less sophisticated gas analysis, assembling readout, current and gain monitoring systems, performing material analysis, etc. This is particularly true in a test-beam situation where the equipment cannot be installed permanently. Usually, these setups also represent a compro-

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mise of sorts with respect to the type of comprehensive aging test that the researchers really would like to conduct. For example, only a certain type of radiation may be available or the detector area that can be irradiated may be very limited, or it might be difficult to vary the gas mixture easily. The result is that aging tests become tedious and inefficient. A GUARD facility would address this recurring problem by providing all the desired infrastructure in one place.

2 Why 'global' ?

As this facility would be dedicated to gaseous detectors, cost would most likely only allow for one such facility. Consequently, it should be open to users world-wide. Conversely, it also would have to be supported by the global users in one or the other form, e.g. by providing know-how, equipment, technical support or staff, and funds.

3 Why 'universal' ?

The facility should be universal in the sense that it should be usable for testing prototype detectors, validating detectors from mass production, and evaluating materials. It should also allow basic R&D and systematic studies to illuminate the underlying processes of aging phenomena. As the nature of detector aging dictates long-term tests, the facility would have to have multi-user capabilities so that tests on several different detectors can be conducted efficiently in parallel.

4 What is needed at GUARD ?

The facility should remove the usual limitations to aging tests outlined above. Most importantly this implies permanent access to a variety of beams. Several X-ray sources, electron and proton beams, and possibly other hadron beams should be available in one place, possibly also a neutron source. The infrastructure for operating the detectors should be highly developed with ultra-clean gas supplies and gas systems, and ready-to-use readout and monitor systems. Sophisticated analysis tools such as gas chromatographs, mass spectrometers, optical and electron microscopes, and maybe a nuclear reaction analysis tool as described by Gavrilov et al. at this workshop should be available at the facility. The irradiation area should allow for full-size exposure of large detectors, one might think of a beam with target and space for placing detectors downstream as needed. A small permanent staff must be available at the facility to help users operate all equipment and to preserve the local know-how.

A positive side effect of conducting aging tests at the facility would be the creation of a 'standard aging test' that will make the comparison of aging behavior for different detectors more meaningful, as reproducing identical conditions in different aging-test setups is notoriously difficult.

5 How to get there ?

The means of achieving such a goal is obviously a collaboration among interested researchers that would contribute their know-how, some equipment and manpower, and funds. One could envision that the facility would get built step-by-step by moderate contributions from collaborating users, maybe starting with some existing infrastructure from a completed experiment. If the gaseous detector community is interested in pursuing such a facility, the first issue to resolve will be to find a host laboratory where the required beams are available and to inquire with funding agencies. The author would be willing to coordinate such an initiative; interested researchers are welcome to contact him in the matter. Can this be the future ? Maybe the next workshop on 'Aging phenomena in gaseous detectors' will tell.