

Catalyzing Societal Impact – IARC at Fermilab

Snowmass 21: Contribution

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The federal investment in the National Laboratories working in fundamental science translates into products and services for the general public over time. The internet and particle accelerators for cancer treatment would be cases in point. Catalyzing the speed by which the public experiences these benefits has tremendous societal and economic impact.

The mission of IARC at Fermilab is to advance technologies developed by the laboratory towards commercialization and, with industry partners, help create products and services that improve the health, wealth, and security of the nation.

IARC is working to make possible the commercialization of compact superconducting RF (CSRF) accelerators in order to extend the application of accelerator technology to many new areas such as environmental remediation, medical device sterilization, waste treatment, and water decontamination. Successful application of accelerator technology to these areas requires continued development of many enabling technologies particularly those that increase energy efficiency. In another Snowmass 21 contribution, Kroc and Thangaraj describe the technical challenges to deliver a compact SRF machine for industry.

Much of the technological and economic impact from particle physics falls in the category of “deep tech”, by which we mean the implementation of substantial scientific or engineering advances. Product development in deep tech requires much greater time and capital compared to product development in other areas (software, for example). Accelerator technology is an example of deep tech.

Leaps in technological capabilities are one of the requirements to reach commercialization of deep tech. But it is not the only requirement. We also need to make sure that we are advancing the right technologies, making the appropriate investments and making a product that addresses commercial needs. Size, ease of use, economics, reliability, regulatory qualification, etc., are all dimensions that need to be looked at in order to be able to make something that ultimately will be useful to industry.

National laboratory technology-development and commercialization arms, like IARC and OPTT at Fermilab, are important as these entities are the ones that drive progress towards commercialization of National Lab developed technologies. We connect and align industry, academia, funding agencies, and the internal experts towards that goal. We represent, jointly with industry scouts and the university technology transfer offices, the axis of the triple helix of academia, government and industry. It would be difficult for deep tech to survive the proverbial “valley of death” without a well-functioning triple helix. Initiatives for the development of accelerator-related technology towards commercialization, like OHEP’s Accelerator Stewardship Program, are very important to seed high risk – high promise ideas.

These initiatives encourage connection and discussion with industry. These discussions open the perspective of the national lab researcher who can then see a discovery or a technology in a new light.

IARC and OPTT at Fermilab, and other commercialization arms of the National Laboratories, engage in activities beyond technology development and technology transfer. They are engaged in connecting the laboratory with the outside entrepreneurial community, high tech industry, and academia. These entities are also engaged in entrepreneurial training and culture change.

The best people to steer research towards commercial impact are the researchers themselves and having a window to the needs of industry is the required insight to do so.

Catalyzing impact is crucial and entities like IARC and OPTT at Fermilab are working hard to make sure it happens.