

Foreword

Innovation can achieve its target by either an incremental or radical change in knowledge. Neutrino physics is an outstanding field in this respect since, in less than 100 years, three elusive fundamental particles have been postulated, searched for, discovered, and characterized by giant steps requiring radical innovations. In almost all cases, the innovation to be undertaken was inconceivable by the same scientific community just a few years before. Well-known are the words of W. Pauli, the neutrino inventor: “I have done a terrible thing. I have postulated a particle that cannot be detected.” And less than ten years later, F. Reines and C. Cowan were able to detect it, apparently driven by the fact that everybody said it could not be done. Not surprisingly, as F. Reines admitted “Clyne (Cowan) knew as little about the neutrino as I did but he was a good experimentalist with a sense of derring-do. So we shook hands and got off to working on neutrinos.”

The beta beam is no more than a recent invention in the neutrino physics history: invention is the first occurrence of an idea for a new product or process, while innovation is the first attempt to carry it out into practice (J.E. Faberger, 2004). However, it will become a true innovation if it benefits from the potential synergy among different scientific disciplines. If you are not an insider in neutrino physics, this is your book: you will learn about neutrino physics in the broadest sense, from theory to acceleration and detection techniques, and you will have a very different view of the challenges and applications that are critical to the expansion of the beta beams potential.

All elements are apparently present to motivate your active contribution to beta beams: just a few years ago, many scientists insisted that they are conceptually impossible (still today, all artificial neutrino beams are produced by meson decay, as pioneered by Lederman, Schwartz and

Steinberger in the 60s). Therefore, don't forget your sense of derring-do, still necessary to pioneers of any time: if there are roses, they will blossom and the next book on beta beams will include your contribution.

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