

Towards a Dedicated High-Intensity Muon Facility

R. Cywinski¹, M.W. Poole², S.L. Smith², P. Dalmas de Reotier³, R. Barlow⁴, K.N. Clausen⁵, T. Shiroka⁵, R. Edgecock⁶, P.J.C. King⁶, J.S. Lord⁶, F.L. Pratt⁶,

¹*School of Physics and Astronomy, University of Leeds, Leeds LS2 9JT, UK*

²*ASTeC, STFC Daresbury Laboratory, Warrington, Cheshire, WA4 4AD, UK*

³*CEA/INAC, 17, rue des Martyrs, 38054 Grenoble cedex 9, France*

⁴*School of Physics and Astronomy, University of Manchester, Manchester M13 9PL, UK*

⁵*Paul Scherrer Institut, CH-5232 Villigen, Switzerland*

⁶*STFC Rutherford Appleton Laboratory, Chilton, Didcot, Oxfordshire OX11 0QX, UK*

This paper discusses possible designs for a high-intensity, stand-alone muon source dedicated and fully optimised for μ SR studies of condensed matter. In particular, we shall focus upon the potential implementation of a new generation of high-power, but relatively compact and cost effective, proton drivers based on non-scaling fixed field alternating gradient (ns-FFAG) accelerator technology [1].

Initial considerations suggest that a facility with multiple optimised pion targets, each affording positron count rates approximately two orders of magnitude higher than existing pulsed muon sources, together with the potential of steady state operation at count rates comparable to the best existing sources, should be achievable at reasonable cost.

We will discuss proton driver characteristics, target geometries and beam delivery, as well as their optimisation for a stand-alone muon facility and present some implications of such a facility for the future of muon science.

In addition, we shall discuss the relative merits of a stand-alone muon facility with respect to those of existing facilities which operate in symbiotic mode with other users of the proton driver. Outstanding technical issues which must be addressed by both muon scientists and accelerator technologists will also be highlighted.

[1] R. Edgecock (EMMA Collaboration), Nucl. Phys. B Proc. Suppl. **155** (2006) 321.