



Science & Technology
Facilities Council



Ionisation Cooling Test Facility @ STFC (ICTF@STFC) WP8

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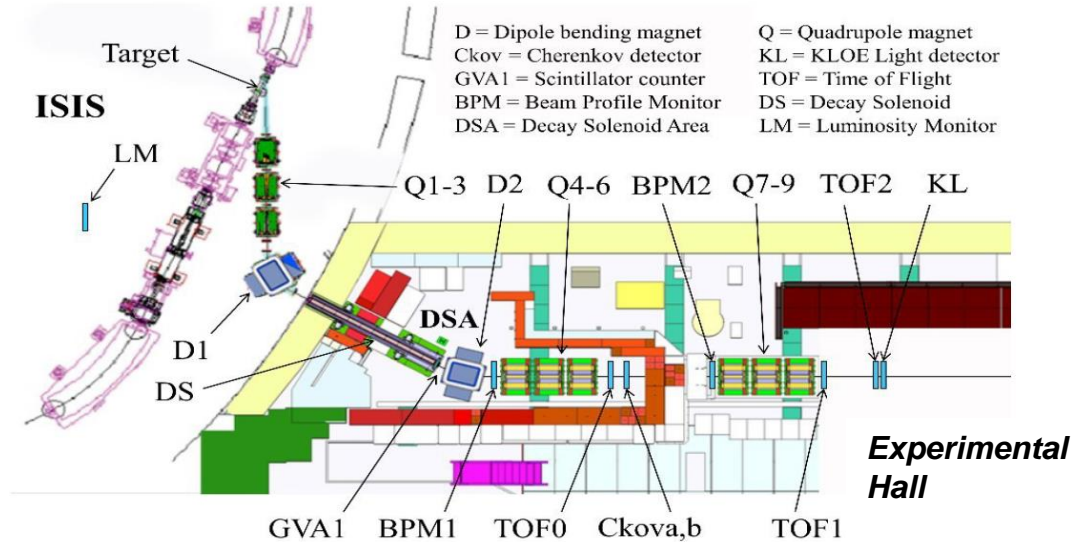


ICTF



ICTF

- The Ionisation Cooling Test Facility (ICTF) comprises a specially developed target and beam-line at the ISIS proton synchrotron (800 MeV) at STFC's Rutherford Appleton Laboratory.
- The beam-line provides μ , p , n , e at 100 MeV/c to 400 MeV/c. It has been operational for several years, though intensity continues to increase.
- The ICTF infrastructure includes installations to supply radio-frequency (RF) power and liquid hydrogen (LH2).
- The ICTF beam and infrastructure have been designed for the study of ionisation cooling, and meet the requirements of the Muon Ionisation Cooling Experiment (MICE), which is installed at the ICTF.
- WP8 under EuCARD-2 supports access to the ICTF.



Users of the ICTF@STFC

- To this point the MICE Project has been the user of the ICTF
- I hope this will change and I will be able to report on an additional experiment utilising the ICTF

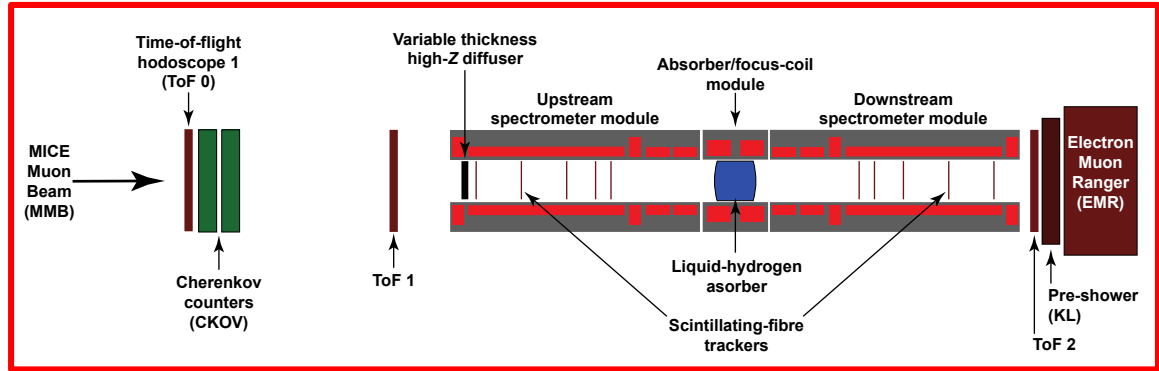
MICE

- Muon Ionisation Cooling Experiment (MICE)
- MICE is a key step for evaluating the feasibility of ionisation cooling for a neutrino factory and possible μ -collider.
- An international project with many collaborators around the world
 - European Collaborators – UK, Switzerland, CERN, Bulgaria, Netherlands, Italy and Belgium.
 - USA, China and Japan
- The ICTF was originally built to supply beam for the MICE experiment

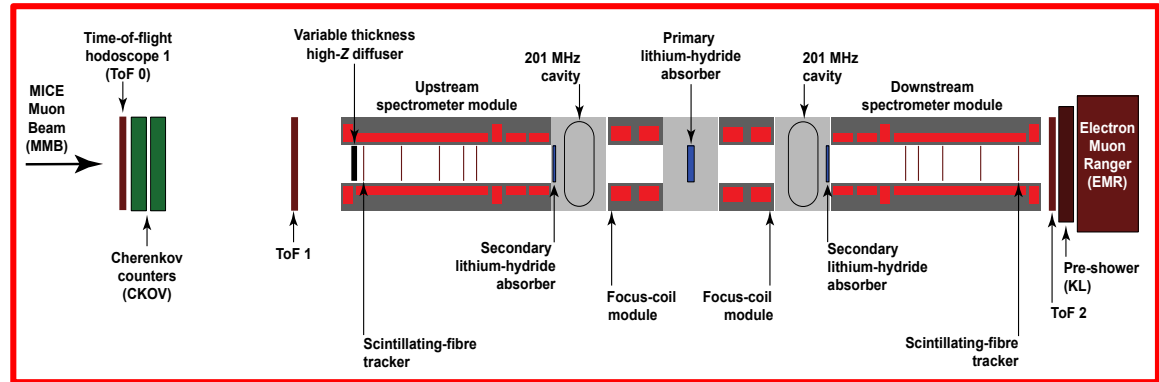
Users Update

MICE SCHEDULE

- Step IV Construction completed September 2015
- Absorber materials to be used are Lithium Hydride and Liquid Hydrogen
- Data taking period to end Feb 2017



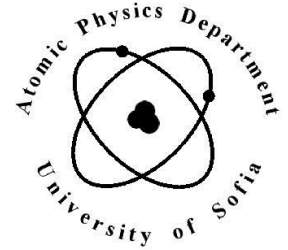
- Cooling Demonstration Construction complete July 2018
- Absorber material to be used for final step is Lithium Hydride
- Data period to Jan 2019





UNIVERSITY OF SOFIA Department of Atomic Physics

(use of MICE Transnational Access programme provisions
for the period 01.04.2015 – 01.04.2016)



- Participants – M. Bogomilov, R. Tsenov, G. Vankova
- Number of TNA-supported visits – 8.
- Total number of days spent – approx. 75
- Areas of work:
 - participation in commissioning and data taking phase of the MICE experiment;
 - maintenance of the KL detector;
 - development, maintenance and improvement of the computer code for Monte-Carlo simulation and for data reconstruction of the KL detector;
 - data analysis.
- Published paper based partly on above work:

MICE Collaboration, D. Adams et al., Pion Contamination in the MICE muon beam, JINST 11 (2016) 03, P03001.

Status report for MPID4 TA project (INFN MiB,Na,Pv,Rm3)

INFN Activities

- The MPID4 activity mainly concerns the PID detectors (TOF system, KL system) maintenance & running during STEP IV
- The availability of TA funds has helped greatly for this: due to the many steps of MICE and ... delays ...
- we had many technical interventions in the MICE Hall (detector re-positioning, cabling/recabling, ...)
- For the analysis the INFN group has contributed to the recent pion contamination paper, published on JINST

Funding Usage

- TA funds were mainly used for MICE shifts and technical interventions in the Hall both for physicists (M. Bonesini, L. Tortora, D. Orestano, A. deBari, V. Palladino), engineers (R. Bertoni) and technicians (S. Banfi, F. Chignoli, R. Mazza, A. Iacofano, M. Capponi)
- Their future availability will be essential for the optimal operation of INFN groups inside MICE

François Drielsma, University of Geneva, PhD student

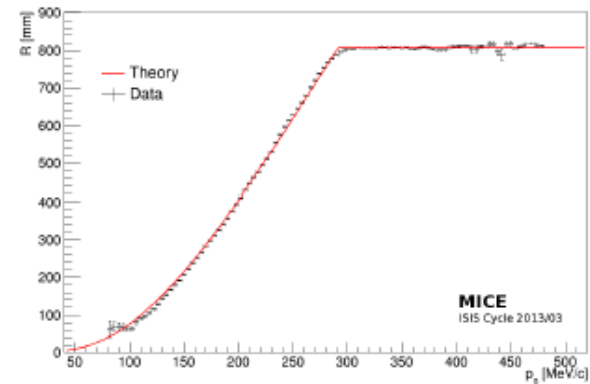
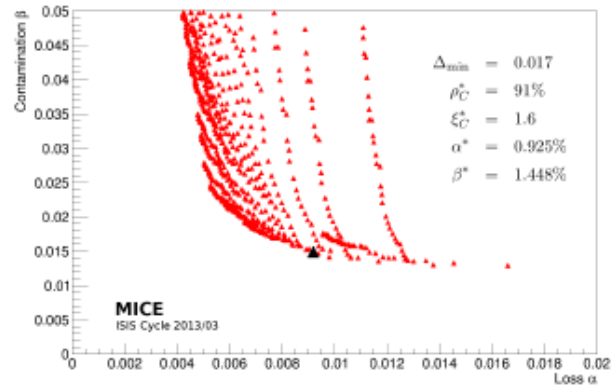
Work carried out by the recipient of the funding:

- Analysis
 - Performance of the Electron-Muon Ranger (EMR) PID detector¹
 - EMR software: track matching, range and momentum recon., etc.
 - EMR range resolution analysis
 - Beam-based detector alignment in the MICE beam line
 - Validation and correction of the MICE Monte Carlo simulation
- Shift
 - 31 shift credits received, equivalent to 29 days of shifting and 5 days of being a deputy MOM
- Detector operation
 - Maintenance and efficiency checks of the EMR detector
 - Minor upgrades on the EMR DAQ hardware
 - Supervision of the physical alignment of the EMR

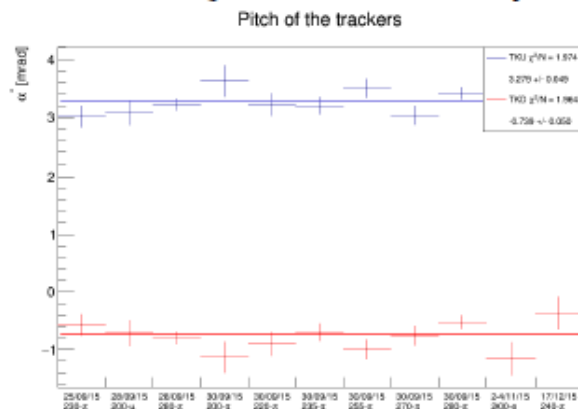
¹Published as first author in JINST at

<http://iopscience.iop.org/article/10.1088/1748-0221/10/12/P12012>

Analysis contribution headlines (FD)

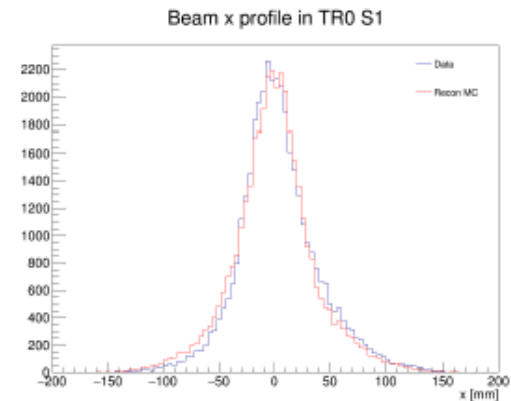


EMR e^{\pm} rejection efficiency



Pitch angle of the trackers (align.)

EMR momentum reconstruction



Recon. MC to data matching



Yordan Karadzhov, University of Geneva, Postdoc

- Detector operation / support
 - ▶ Coordinating the work in the MICE Online group.
 - ▶ Maintenance of the MICE Data Acquisition (DAQ) system.
 - ▶ Development of a FPGA-based trigger system for MICE.
 - ▶ Tests and integration of the new trigger system into the MICE DAQ.
 - ▶ Development of a software framework for real-time data reconstruction during the data-taking process (Online Reconstruction). Parallelization used to greatly reduce the processing time.
- Shift
 - ▶ 2 MOM shifts - 56 days.



Institute of Physics University of Belgrade researchers' use of EUCARD2 funds



- Users which used EUCARD2 funds till now are dr. Dimitrije Maletic, dr. Dejan Jokovic, PhD students Mihailo Savic and Nikola Veselinovic. Till now funds were not used by dr. Vladimir Udovicic.
- Funds were used for three week of shifts of Data taking for MICE experiment, in addition to four visits to RAL for shifts trainings, after which we had four researchers trained for MICE shifts and ready to continue contributing to the MICE experiment.
- Visits to RAL also resulted in dozen of meetings with MICE experts, which resulted in that that researchers from Belgrade were able to contribute with Analysis of Energy loss in MICE absorbers (D. Maletic) presented on two collaboration meetings, operations - Grid batch MC production for MICE experiment (D. Maletic) presented at last MICE CM, and with software development of Event Viewer for MICE experiment (M. Savic) presented at last MICE CM. Contacts allowed us to start working on another operations task - Online monitoring for MICE experiment (D. Jokovic).
- Till now, there were no papers published as a result of our use of EUCARD2 funds, and our participation to the MICE collaboration, but we are expecting to be on the author list of MICE collaboration very soon.



Allocations and Access

Allocations made and Access units

Institute	Allocation period start	Allocation period end	Current period	Allocation(€)	Spend on allocation (€)	Num Users for period	User days for period	Access Units for period
Geneva	Sep-13	Sep-14	No	20000	28994	9	214	895
University of Sofia	Sep-13	Mar-15	No	12000	4920	1	29	121
INFN	Sep-13	Mar-15	No	30000	6770	6	80	334
Geneva	Sep-14	Sep-15	No	20000	20229	5	107	447
University of Sofia	Mar-15	Sep-16	Yes	20000	11279	3	58	242
INFN	Mar-15	Sep-16	Yes	25000	10212	4	70	293
Belgrade	Mar-15	Mar-17	Yes	20000	11158	4	60	251
Geneva	Sep-15	Mar-17	Yes	25000	13022	3	129	539
Totals				€ 150,913	€ 106,584	28	430	3122
Budget				€ 153,615			Required Access Units	2280
Remaining budget					€ 47,031		Percentage	137%

Remaining budget to be allocated - €3,000

Remaining allocation to spend - €47,031

Access units gained on current spend – 3122

- Total funding for the 4 year project – €199,058
 - Access management estimate – €45,443
 - Leaving €153,615 Euro for access support
- This estimate has come from the following :-
 - Number of visits – 36
 - Persons present per visit – 2
 - Days spent at the facility – 8
 - Travel estimate used – €700
 - Subsistence (Accommodation + subsistence) – €182
- My estimates for travel and subsistence
 - Return flight to be no more than €400
 - Accommodation (including breakfast) at Ridgeway house £60 (€72)
 - Meals - £35 (€42)
- Total Units of Access for the lifetime of the project – 2280