New Muon Collaboration Leader meets INFN-Accelerator Community

📅 Monday 12 Oct 2020, 16:00 → 18:30 Europe/Rome

aMUSE: advanced Muon Campus in US and Europe contribution

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The Project

❑ Marie Skłodowska-Curie Actions: RISE Research and Innovation Staff Exchange

❑ It lasts for 48 months

❑ Start date 1 April 2021

❑ Total funded 1,899,800.00 €

❑ Grant agreement in preparation

❑ One of the 74 projects selected among 408 proposals

Description

aMUSE plans to strengthen and extend the collaboration between EU and US researchers to carry out cutting-edge searches for New Physics in the muon sector, while promoting the development of next generation muon accelerators. The project finds its roots in the previous MUSE network based at the Muon Campus of FNAL.

It involves the experiments:
- g-2
- Mu2e
- Mu2e-II and $\mu \to e\gamma$ $\mu \to eee$ experiments with PIP-II
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- **Muon Beams studies**: aMUSE will create, for the first time, a network that connects the European community with the US community, both with longstanding history on muon beams and currently hosting two of the laboratories leading the searches at the intensity frontiers. This collaboration will seed the developments of high intensity muon beams in view of future applications for higher-brightness low energy muon beams and high-luminosity, high energy Muon Collider.

Participants

PI of the project Simona Giovannella, INFN Frascati

#	Participant Legal Name	Country
1	ISTITUTO NAZIONALE DI FISICA NUCLEARE	IT
2	UNIVERSITA DEGLI STUDI DI PADOVA	IT
3	HELMHOLTZ-ZENTRUM DRESDEN-ROSSENDORF EV	DE
4	LABORATORIO DE INSTRUMENTACAO E FISICA EXPERIMENTAL DE PARTICULAS LIP	PT
5	ASSOCIAZIONE FRASCATI SCIENZA	IT
6	COSTRUZIONI APPARECCHIATURE ELETTRONICHE NUCLEARI CAEN SPA	IT
7	UNIWERSYTET JAGIELLONSKI	PL
8	JOHANNES GUTENBERG-UNIVERSITAT MAINZ	DE
9	UNIVERSITA DEGLI STUDI DI ROMA LA SAPIENZA	IT
10	TECHNISCHE UNIVERSITAET DRESDEN	DE
11	FERMI RESEARCH ALLIANCE LLC	US
12	PAUL SCHERRER INSTITUT	Switzerland
13	BROOKHAVEN SCIENCE ASSOCIATES LLC	US
14	BOARD OF TRUSTEES OF THE LELAND STANFORD JUNIOR UNIVERSITY	US
15	SAINT GOBAIN CRISTAUX ET DETECTEURS	FR

Work Package No	Work Package Title	Activity Type	person-months involved per secondment	Lead Beneficiary
1	Muon Campus Experiments	Research, Training, Dissemination	168	INFN
2	Muon Campus Upgrade	Research, Training, Dissemination	93	UniRM
3	Muon Beams	Research, Training, Dissemination	62	UniPD
4	Software Tools	Research, Training, Dissemination	55	LIP
5	Communication & Outreach	Communication, Training	4	Frascati Scienza
6	Transfer of Knowledge	Research, Training, Dissemination	28	HZDR
7	Management	Management, Communication, Dissemination	3	INFN

Muon Beams coordinator Donatella Lucchesi UniPD

Muon Beams Participants

Work Package Number	3		Start/End Month		1/48		
Work Package Title	Muon Beams						
Lead Beneficiary	UniPD						
Participating organisation Short Name**	UniPD	INFN	PSI	UniRM	LIP	HZDR	FNAL	BNL
Total Person Months per Participating organisation:	22	13	12	6	5	4	0	0

Donatella Lucchesi, Marco Zanetti, Gianmaria Collazuol	UniPD
Francesco Collamati	UniRM
Massimo Casarsa, Paola Sala	INFN
Angela Papa	PSI
Anna Ferrari	HZDR
Michele Gallinaro	LIP
Mark Palrmer	BNL
Nikolai Mokhov	Fermilab

Muon Beams WP3 Description

Objectives

- Study different techniques of muon beams cooling at different energies aimig to validate simulation with experimental tests
- High energy muon beams:
  - study beam-induced background and strategy to handle it
  - Simulate detector for different center of mass energy
  - Evaluate radiation hazards related to the neutrino flux

Tasks

1. Muon Beams Cooling: develop a compression approach for low energy negative muon beam monte carlo simulation and tests at PSI.
2. Study of the beam-induced background at several centre of mass energies to optimize the beams interaction point.
3. Neutrino induced radiation hazard evaluation.
4. Study and optimization of the detector at high energy muon beams:

WP4 Software Tools

Objectives

Cross-fertilization of specific expertise developed in WPs 1-3 into one synergic activity among all network participants. Tools and common resources are shared.

Here the activities related to muon beams.

Tasks
1. Simulation of the interaction and transport of particles and nuclei in matter.
2. Simulation of Muon Beams and detector.
3. Deep Learning techniques applied to data analysis.
4. Deep Learning applied to pattern recognition.

Inter-multidisciplinary aspects

A collaboration with the Legnaro National Laboratory (Padova, Italy) is foreseen to use the US expertise on unstable beam cooling to the improvement of the Radioactive Ion Beam (RIB) facility inside SPES, the INFN facility for Selective production of Exotic Species, dedicated to Nuclear Physics Studies and industrial applications.