

Outreach and Dissemination

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Scuola Normale Superiore and INFN, sezione di Pisa



MUSE Mid-Term Meeting
Frascati, 11 May 2017

WP5 mission**WP5 – from Grant agreement n. 690835 (MUSE)****Outreach**

- ▶ promotion of communication between scientific community and general public
- ▶ increase of science awareness

Dissemination

- ▶ report and publish scientific and technological results

Tasks and Deliverables

Tasks

Task 5.1: MUSE Workshop day (ALL) At the same time as the MUSE annual general meeting, we will organize a one-day workshop. The target of the seminars and lectures given by the MUSE researchers will be university students in physics, engineering and computing science and, possibly, technical high school students at the last year. MUSE laboratories will be open for demonstrations.

Task 5.2: MUSE Open day (INFN, HZDR) The MUSE partners already take part in the "European Researchers Night" and "Night of Science". To coincide with this event, all the MUSE laboratories at INFN and HZDR will be open to the general public to show and discuss the results of our research. We will prepare posters and brief interactive simulations on the computer.

Task 5.3: Annual Physics Meeting at LNF (INFN) The target of this three-day event is high school teachers and the goal is to give information on the recent advancements in the field of sub-nuclear and nuclear physics and detector developments. A special effort will be made to prepare experiments which involve the new detector components developed by the MUSE project.

Task 5.4: Coordination of UK outreach activities (UCL, LIV) Liverpool and UCL MUSE collaborators organize "masterclasses" for high-school students, with tour of the laboratory facilities and hands-on measurement using prototypes of the g-2 straw trackers, exhibits for the annual Royal Society Show and Big Bang Fair, dedicated work-experience placements for high-school students on

detector development and high-level software.

Task 5.5: Summer School at Fermi National Accelerator Laboratory (ALL) The MUSE researchers seconded at FNAL will organize a three-day training on the MUSE research activities for all the students of the FNAL European Master Degree, organized by INFN and the University of Pisa. We will make an effort to give the students the opportunity to meet CAEN and PRISMA researchers and discuss the prospects of working on research and development in European private companies.

Task 5.6: Outreach web site (ALL) We will develop a public section of the web site with a detailed description of the MUSE project and with all the information for the general public. This work package foresees one secondment for each year, to coordinate the activities connected to the Summer School at FNAL.

Deliverables

D5.1 : MUSE @ HZDR open day [month 9] MUSE laboratories opened to the general public

D5.2: Annual Physics Meetings [month 22] Experiments prepared for the LNF three-day event for high school teachers

D5.3: Masterclasses [month 28] Masterclasses for high-school students, with tour of the laboratory facilities and hands-on measurement using prototypes of the g-2 straw trackers

D5.4: FNAL Summer School [month 44] Three-day training on the MUSE research activities for all the students of the FNAL European Master Degree

Outline

Outreach

- ▶ completed and planned activities
- ▶ status of deliverables

Dissemination

- ▶ status of presentations and papers on MUSE activities

Task 5.1: One-day workshop at the MUSE General Meeting

One-day workshop at the end of MUSE meeting September 2016

Seminars on a selection of Pisa research activities, including

- ▶ one 1-hour seminar on the Fermilab Muon $g-2$ experiment
- ▶ one 1-hour seminar on the Fermilab Mu2e experiment
- ▶ two 15 minutes reports from 2 FNAL Summer students involved in MUSE activities

<https://agenda.infn.it/conferenceDisplay.py?confId=11957>

Friday, 30 September 2016

09:45 - 10:30	<p>Application of SiPMs in Positron Emission Tomography 45'</p> <p>Speaker: MATTEO MORROCCHI (PI)</p> <p>Material: Slides </p>
10:30 - 11:00	<p>Coffee break</p>
11:00 - 11:45	<p>Reactor Physics Group Activities 45'</p> <p>Speaker: Valerio Giusti</p> <p>Material: Slides </p>
11:45 - 12:30	<p>Medical Image Processing Using Brain Emulation 45'</p> <p>Speaker: Dr. Calliope-Louisa Sotiropoulou (PI)</p> <p>Material: Slides </p>
12:30 - 14:30	<p>Lunch break</p>
14:30 - 15:30	<p>A Rare Opportunity - the Mu2e experiment at Fermilab 1h0'</p> <p>Speaker: Dr. Douglas Glenzinski (Fermilab)</p> <p>Material: Slides </p>
15:30 - 16:30	<p>The Muon $g-2$ Experiment 1h0'</p> <p>Speaker: Franco Bedeschi (PI)</p> <p>Material: Slides </p>
16:30 - 17:00	<p>Our experience as FNAL summer students 30'</p> <p>Speakers: Mr. Gabriele Taddei (University of Pisa), Naranjo De Candido</p> <p>Material: Slides </p>
17:00 - 17:30	<p>Coffee break</p>

Task 5.1: One-day workshop at the MUSE General Meeting

MUSE seminars in September 2016 MUSE meeting

A Rare Opportunity, the Mu2e Experiment

Doug Glenzinski
Fermilab
September-2016

The Muon $g-2$ Experiment at FNAL

Franco Bedeschi, INFN – Pisa
MUSE Workshop
Pisa, September 2016

- Outline**
- ❖ Introduction
 - ❖ History of $g-2$
 - ❖ Theory progress
 - ❖ Experiment
 - ❖ Conclusions

MUSE Workshop, Pisa - Sept. 2016

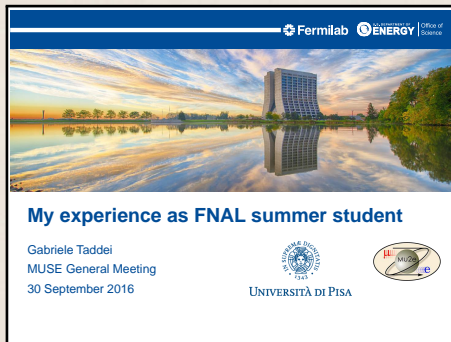
10/55

F. Bedeschi, INFN, Pisa



Task 5.1: One-day workshop at the MUSE General Meeting

MUSE reports by FNAL Summer students in September 2016 MUSE meeting



Fermilab ENERGY Office of Science

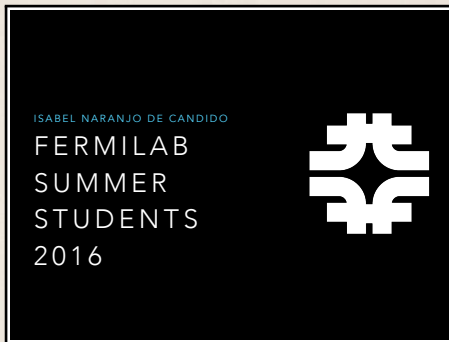
My experience as FNAL summer student

Gabriele Taddei
MUSE General Meeting
30 September 2016

UNIVERSITÀ DI PISA

MUSE

Engineering grad. student, worked on Mu2e



ISABEL NARANJO DE CANDIDO

**FERMILAB
SUMMER
STUDENTS
2016**

Engineering grad. student, worked on
accelerator superconducting cavities cooling

Task 5.1: One-day workshop at the MUSE General Meeting

Planned outreach activities following MUSE meeting in May 2017

- ▶ May 15, three seminars in 2 hours to illustrate the Mu2e experiment and electromagnetic calorimeter
- ▶ May 17, one lecture of 30 minutes and 2.5 hours of laboratory measurements on Mu2e calorimeter crystals and SiPMs

<http://muse.lnf.infn.it/event/>


2017-muse-general-meeting-outreach-event/

MUSE

The Mu2e Electromagnetic Calorimeter



MUSE outreach program for University students

15-17 May 2017
University of Rome "Tor Vergata"
INFN - Laboratori Nazionali di Frascati



Monday, 15 May 2017, 10:00 A.M.
University of Rome "Tor Vergata" Aula Grassano
3:30 P.M.
Seminar
11:00 Building 36 Room 104
Introduction to laboratory measurements

Wednesday, 17 May 2017, 2:00 P.M.
Laboratori Nazionali di Frascati
Hands-on laboratories
Tutors: E. Diociaiuti, R. Dorigatti
11:00 Building 36 Room 104
Introduction to laboratory measurements
11:30 Building 24
Measurement of Scintillation Properties for Cal Crystals
Measurement of Silicon Photomultiplier Properties

Task 5.2, MUSE at HZDR and INFN open days

Article in the German-language in-house HZDR magazine INSIDER, April 2016

HZDR collaborators published an article on MUSE in the German-language in-house HZDR magazine INSIDER, titled "European Detectors for the Muon Campus in Fermilab") (<https://www.hzdr.de/db/Cms?p0id=46807>)

FORSCHUNG

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EUROPÄISCHE DETEKTOREN FÜR MYONEN-CAMPUS AM FERMILAB

Myonen sind so etwas wie ein zu wohl genährter Zwilling der Elektronen: Sie zählen ebenfalls zu den negativ geladenen Elementarteilchen, haben sogar die gleichen Eigenschaften, sind aber rund 200 Mal schwerer. Zwar sind die kleinen Schwergewichte nur eine von mittlerweile über zwei Dutzend Teilchenarten im Standardmodell der Teilchenphysik, doch sie haben das Potential, das bewährte Modell kräftig ins Wanken zu bringen. Sollte nämlich eine Umwandlung von Myonen zu Elektronen nachgewiesen werden, ohne dass dabei ein weiteres Tochterteilchen entsteht, könnte dies nicht mehr im Standardmodell erklärt werden.

Im neuen EU-Projekt MUSE – *Muon campus in US and Europe contribution* arbeiten deshalb europäische und US-amerikanische Forscher intensiv zusammen, um diese Myonen-Umwandlung zu erforschen. Diese Suche nach „neuer Physik“ erfolgt in der Nähe von Chicago am *Fermi National Accelerator Laboratory* – kurz: Fermilab. Mit insgesamt sechs weiteren europäischen Einrichtungen beteiligt sich auch das HZDR an MUSE. Die Experimente am Fermilab ergänzen die europäische Forschung im Bereich der Teilchenphysik. Das Projekt soll Netzwerke für Detektortechnologien in Europa aufbauen und Kooperationen mit den USA stärken. Es läuft über das EU-Programm für Personalaustausch

im Bereich Forschung und Innovation RISE und geht bis Ende 2019.

Für ihren Beitrag zu MUSE erhalten die HZDR-Wissenschaftler um Dr. Anna Ferrari EU-Fördergelder in Höhe von rund 110.000 Euro. Im Fokus steht dabei die Entwicklung und Charakterisierung hochsensibler Detektoren sowie die Auswertung der gewonnenen Daten. Am ELBE-Zentrum für Hochleistungs-Strahlenquellen gibt es dafür ideale Voraussetzungen: Eine starke Neutronenquelle ermöglicht es, die empfindlichen Detektoren auf Langlebigkeit zu testen. Diese Detektoren bestehen aus einem Kristall und einem Halbleiter-Fotodetektor. Sie werden somit nicht von Magnetfeldern beeinflusst und lassen sich sehr gut verkleinern, weshalb auch ein Wissenstransfer in die medizinische Physik angestrebt wird: Bildgebungsverfahren wie die Positronen-Emissions-Tomographie könnten damit verbessert werden.

Parallel zur MUSE-Kooperation zwischen der EU und den USA entsteht mit COMET ein zweites Forschungsprojekt zur Myonen-Umwandlung am japanischen Forschungszentrum J-PARC. Durch eine Kooperation mit dem Institut für Kern- und Teilchenphysik der TU Dresden unterstützen auch dieses Projekt Dresdner Forscher.

CD

Task 5.2, MUSE at HZDR and INFN open days

HZDR Open Day, May 28, 2016, <http://www.hzdr.de/db/Cms?p0id=41069&pNid=2828>

two MUSE posters presented, open day attendance 3400 visitors

- ▶ “Das mu2e Experiment am FERMILAB in Chicago” (“The mu2e experiment at FERMILAB in Chicago”)
- ▶ “Von der Teilchenphysik zur medizinischen Anwendung” (“From particle physics to medical applications”), how research on detector technology for particle can improve diagnostics for cancer therapy

o-Sensoren für das Mu2e Experiment

Leistungsfähige (SPM) für Mu2e sollen in einem sehr starken Strahlungsfeld über eine Fläche von 2 · 10⁷ Neutronen pro Jahr ausfallen. Das ist ein 4,846 MeV-Bremsstrahlungstrahl mit einer typischen Neutronenenergie, um niedrigsteigend zu überprüfbar. Die folgenden Sensoren sind vorgesehen:

Leistung des SPM über einen Bereich von 10¹⁰ bis 10¹² Neutronen/cm² (Schwellenwert von 10¹⁰ Neutronen/cm²)

Neutronenfluss am FDSO (Schwellenwert von 10¹⁰ Neutronen/cm²)

Detektoren für die Spitzenforschung

Erregungen mit sehr seltenen Kernen werden großflächig Detektoren mit einer 100-Neutrons-Kennlinie für die Spitzenforschung (wie Phosphor-31) herfür sind sehr teuer. Für ein HZDR und an der TU Dresden werden Klichs in Experimenten mit einer Zellen, dass auch mit dem neuen, kostengünstigen SPM, solche Klichs möglich sind.

Erregung für eine Zellenlösung von einer 1000-Neutrons-Kennlinie und bereit Bedingungen für solche Messungen.

Das PNP ist ein großer Komplex des Neutronenflussmessers (FDSO) mit einer Fläche von ca. 100 cm².

Das Experiment "Spitzenforschung" ist ein Teil des HZDR, das Detektoren mit einer 100-Neutrons-Kennlinie für die Spitzenforschung (wie Phosphor-31) herfür sind sehr teuer.

Anwendung (z.B. Bildgebung bei Krebstherapie)

Wird benötigt man komplexe Detektorsysteme, die schnell zuverlässige Ergebnisse liefern. Wichtige Kriterien dabei sind, wie Zielvorgabe. Dieses erfolgt in einer speziellen Strahlungsquelle, sowie eine Neutronenquelle für die Vorläufer der Spalten. Sensoren für klinische Anwendungen sind die Neutronenquelle geeigneter Magnesiumdioxid und die Zellen.

Ergebnis von: Neutronenflussmessung im Aufschluss auf: Neutronenflussmessung (FDSO, Neutronen) Neutronenflussmessung (Schwellenwert)

Motivation

Im Rahmen des Standardmodells der Teilchenphysik werden sowohl Übergänge zwischen dem sogenannten Quarks (Neutronen, 2009 für Kollaborativ und Markov) als auch des Neutrons (Neutronen, 2015 für Analyse und Markov) vorhergesagt und beobachtet.

Leidlich für die geladenen Leptonen e, μ und τ werden bei heute keine direkten (zerfallenden) Übergänge beobachtet, und die Standardmodell-Vorhersage ist nur einen Wertungsmaßstab von $\sim 10^8$ entfernt. Eine solche hier von Übergang Lepton Flavor Violation (LFV), da die Leptonen nicht erhalten ist.

Es gibt jedoch verschiedene Erweiterungen des Standardmodells, die diese Übergänge allgemein erlauben die Verengungsbereichen von bis zu $\sim 10^5$ verengen.

Das Experiment

Die experimentelle Nachbildung der mit dem Standardmodell verbundenen $\mu \rightarrow e \gamma$ Übergänge wird durch die Beobachtung des $\mu \rightarrow e \gamma$ Übergangs ($\mu \rightarrow e \gamma$) zu messen ($\sim 10^8$), SENSUM Exp. am PSI.

Hierzu wird ein 8 GeV Protonenstrahl auf ein gelbes Goldtarget (Zinn) (Zinn) in Myonen, negativ geladene Myonen sondern die oder komplexen Magneten sondern die zu erzeugen. Die Myonen werden von den Abstrahlungsstrahl und Neutronen auf das untere Schichten des erdenden von Kollaborativ, oder zu den Neutronen oder Auswertung eines Detektors.

Die weiteren Elektronen werden mittels einer ersten Spartenblende und einem Kalorimeter geladene Detektorsystem nachgemessen. Für die elektronenphysikalischen Eigenschaften wird ein einzelnes schärfes Peak in der Nähe der Myonenmasse $M_{\mu} \approx 105.66$ MeV/c² beobachtet, während für Übergangsemission (Lepton-Flavor Violation) ein Spektrum erwartet wird, das deutlich von M_{μ} abweicht. Ein Anstieg der Signalregione wird auf die Anzahl der Signalereignisse nachweisbar.

$$R_{\mu \rightarrow e \gamma} = \frac{\Gamma(\mu \rightarrow e \gamma)}{\Gamma(\mu \rightarrow e \nu \bar{\nu})} = \frac{\Gamma(\mu \rightarrow e \gamma)}{\Gamma(\mu \rightarrow e \nu \bar{\nu})}$$

Detektoren

Die Detektoren sollen sowohl in Magneten mit 5 Tesla als auch unter Vakuumbedingungen (10⁻⁷ Torr) funktionieren. Aus der die Experiment beschreiben, Strahlungsbedingungen über 2 Jahre auszuhalten. Die Wahl für ein neues aus mehr als Detektoren beschreiben Spartenblenden sowie ein zwei fliegen aufgebaut Kalorimeter, welches aus ~ 1000 cm² Kristalle besteht, die von 100 bis 1000 MeV Energie (günstig) empfangen werden.

Spezialdetektor: Neutronenflussmessung $\sim 10^8$ Neutronen/cm² (Schwellenwert von 10¹⁰ Neutronen/cm²)

Spezialdetektor: "Klick" für DDD-Energie

Kalorimeter: ~ 1000 cm² Kristalle

~ 1000 cm² Kristalle

~ 1000 cm² Kristalle

~ 1000 cm² Kristalle



Task 5.2, MUSE at HZDR and INFN open days

Dresden “Lange Nacht der Wissenschaften”, June 10, 2016

- ▶ two MUSE posters presented at the “Long night of Research”
- ▶ <https://www.hzdr.de/db/Cms?pNid=3075>



Task 5.2, MUSE at HZDR and INFN open days

INFN Pisa open lab days, September 30, 2016

- ▶ **INFN Pisa Mu2e researchers** presented their research by their detector laboratory
- ▶ <http://www.bright-toscana.it/pisa/laboratoriaperti/>



Task 5.3, MUSE at Annual Physics Meeting at LNF (INFN)

MUSE at Incontri di Fisica 2016, Frascati, October 5-7, 2016

- ▶ three-day training course for high school teachers and scientific journalists
- ▶ MUSE researchers organized **working group on Particle Detection with Scintillating Material: Mu2e calorimeter SiPM photosensors vs. traditional photomultipliers**
- ▶ <http://muse.lnf.infn.it/event/muse-idf-2016/>



Task 5.4, UK outreach activities

Masterclasses

- ▶ masterclasses for high-school students, with tour of laboratories and hands-on measurement on detector prototypes, **~7 hours in one day for 80–100 students**

University College London (UCL)

- ▶ Muon $g-2$ and Mu2e activities presented in the overview of Physics research at UCL
- ▶ **February 15, 2016** **March 30, 2017**

Liverpool (LIV)

- ▶ Muon $g-2$ researchers did
 - ▶ **lectures**
 - ▶ **tour of the clean rooms**
 - ▶ **demonstration of the straw chambers production process**
- ▶ **February 24, 2016** **June 22, 2016** **March 1, 2017**

Task 5.4, UK outreach activities

pictures of Liverpool March 1, 2017 masterclass



Task 5.4, UK outreach activities

Work-experience placements by UCL

- ▶ from June to August 2016, **2 students** did work-experience placement activities on the construction of the Gm2 tracker, spending **also one month in Fermilab**

Work-experience placements by Liverpool

- ▶ in June 2016, with the Liverpool group, **4 students** did work-experience placement activities on the Gm2 tracker
- ▶ in August 2016, with the Liverpool group, **4 students** did work-experience placement activities on the Gm2 tracker

Task 5.4, UK outreach activities

UCL high school students Work-experience placements at FNAL in 2016



Task 5.5, Summer School at Fermi National Accelerator Laboratory

Seminars on FNAL Gm2 experiment, for FNAL Summer students, August 2, 2016



MUSE **Fermilab**

“The Muon g-2 Experiment”

Training lectures for the students of the Summer School “Summer Students at Fermilab and other US laboratories” (Fermilab, INFN and the University of Pisa)

Lectures

Tuesday, August 2 – Comitium – Wilson Hall

9:00 - 9:40 C. Polly, “Overview of the Muon g-2 experiment at FNAL”
9:40 - 9:50 questions and discussion
9:50 - 10:30 B. Casey, “The tracker of the Muon g-2 experiment at FNAL”
10:30 - 10:40 questions and discussion

10:40 - 10:55 Break

10:55 - 11:35 J. Kaspar, “The calorimeter of the Muon g-2 experiment at FNAL”
11:35 - 11:45 questions and discussion

11:45 - 14:30 Lunch break

14:30 - 15:00 C. Ferrari, “Calibration of the Muon g-2 calorimeter”
15:00 - 15:10 questions and discussion

Task 5.5, Summer School at Fermi National Accelerator Laboratory

Summer Students tour at the UK MUSE laboratories at FNAL, August 17, 2016

three groups of 10 students each attended a guided tour of the UK Muon Gm2 laboratories at FNAL

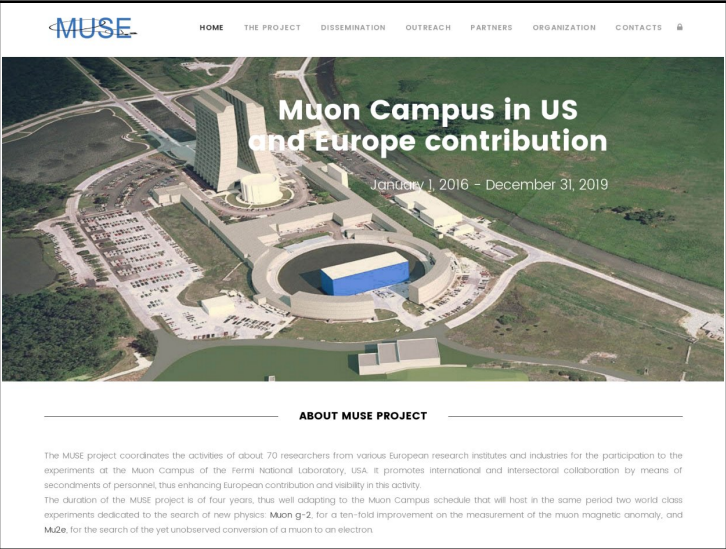


Task 5.5, Summer School at Fermi National Accelerator Laboratory

- ▶ outreach activities for 2017 FNAL Summer students are being planned

Task 5.6, Outreach using MUSE web site

MUSE web site online since May 2016, <http://muse.lnf.infn.it/>



MUSE HOME THE PROJECT DISSEMINATION OUTREACH PARTNERS ORGANIZATION CONTACTS

Muon Campus in US and Europe contribution

January 1, 2016 - December 31, 2019

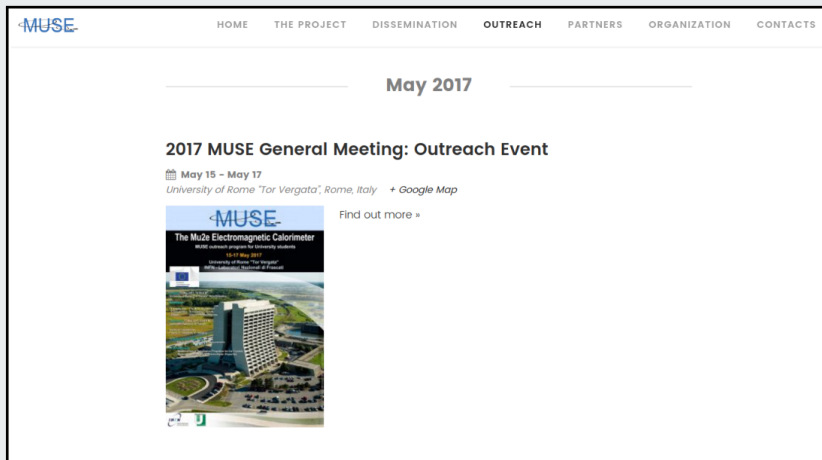
ABOUT MUSE PROJECT

The MUSE project coordinates the activities of about 70 researchers from various European research institutes and industries for the participation to the experiments at the Muon Campus of the Fermi National Laboratory, USA. It promotes international and intersectoral collaboration by means of secondments of personnel, thus enhancing European contribution and visibility in this activity.

The duration of the MUSE project is of four years, thus well adapting to the Muon Campus schedule that will host in the same period two world class experiments dedicated to the search of new physics: **Muon g-2**, for a ten-fold improvement on the measurement of the muon magnetic anomaly, and **Mu2e**, for the search of the yet unobserved conversion of a muon to an electron.

Task 5.6, Outreach using MUSE web site

outreach in MUSE web site, <http://muse.lnf.infn.it/events/category/outreach/>



The screenshot shows the MUSE website's outreach page for May 2017. The navigation bar includes: HOME, THE PROJECT, DISSEMINATION, **OUTREACH**, PARTNERS, ORGANIZATION, and CONTACTS. The main heading is "May 2017". Below it, the event is titled "2017 MUSE General Meeting: Outreach Event". The dates are "May 15 - May 17" and the location is "University of Rome 'Tor Vergata', Rome, Italy" with a "+ Google Map" link. A promotional image for "The Mu2e Electromagnetic Calorimeter" is displayed, featuring the MUSE logo, the text "The Mu2e Electromagnetic Calorimeter", "MUSE outreach program for University students", and "15-17 May 2017". The image also shows the University of Rome Tor Vergata building and the European Union flag. To the right of the image is a "Find out more »" link.

► 10 outreach events reported

Dissemination

- ▶ papers and presentations are listed on the muse web site
 - ▶ <http://muse.lnf.infn.it/paper/>
 - ▶ <http://muse.lnf.infn.it/events/category/talks/>

papers

- | | |
|---|--|
| <ul style="list-style-type: none"> ▶ S. Di Falco <i>et al.</i>, Components Qualification for a Possible use in the Mu2e Calorimeter Waveform Digitizer, JINST 12 (2017) C03088 ▶ S. Baccaro <i>et al.</i>, Irradiation study of UV Silicon Photomultipliers for the Mu2e calorimeter, JINST 12 (2017) C02022, arXiv:1701.0646 ▶ N. Atanov <i>et al.</i>, The calorimeter of the Mu2e | <p>experiment at Fermilab, JINST 12 (2017) C01061, arXiv:1701.0797</p> <ul style="list-style-type: none"> ▶ A. Anastasi <i>et al.</i>, Electron beam test of key elements of the laser-based calibration system for the muon $g-2$ experiment, Journal: Nucl. Instrum. Meth. A 842 (2017) 8, arXiv:1610.0321 |
| <ul style="list-style-type: none"> ▶ ... total of 17 papers and conference proceedings | |

presentations

- | | |
|---|---|
| <ul style="list-style-type: none"> ▶ I. Sarra (INFN LNF), TIPP 2017 – The Mu2e Calorimeter Photosensors, May 22-26, 2017, Beijing, China ▶ G. Pezzullo (INFN Pisa), TIPP 2017 – Design, status and perspectives for the Mu2e crystal calorimeter, May 22-26, 2017, Beijing, China | <ul style="list-style-type: none"> ▶ E. Diociaiuti (INFN LNF), IFAE 2017 – L'esperimento Mu2e al Fermilab (in Italian), April 19-21, 2017, Trieste, Italy ▶ A. Driutti (INFN UD), IFAE 2017 – The Muon $g-2$ experiment, April 19-21, 2017, Trieste, Italy |
| <ul style="list-style-type: none"> ▶ ... total of 34 talks and posters | |

Dissemination, best poster award at IFAE 2016 Italian conference



Octavio Escalante

PhD student at University of Napoli

The Calibration System of the new g-2 experiment at Fermilab
 A. Accardi¹, M. Barabini¹, F. Bellodi¹, G. Cantatore², D. Cianci³, G. Corbelli⁴, S. Dalonghi⁵, P. Di Momi⁶, G. Di Stefano⁷, R. Di Stefano⁸, A. Dittus⁹, G. Escalante¹⁰, C. Ferrero¹¹, A. Fiumi¹², C. Galluzzi¹³, D. Hangan¹⁴, M. Innocenzi¹⁵, A. Lottini¹⁶, M. Kassar¹⁷, S. Mammone¹⁸, D. Maricciaci¹⁹, G. Passera²⁰, N. Rubei²¹, E. Rossi²², L. Santi²³, G. Stenone²⁴

INFN CNEA
 INFN Laboratori Nazionali di Frascati
 INFN Laboratori Nazionali di Legnaro
 INFN Laboratori Nazionali di Pisa
 INFN Laboratori Nazionali di Roma
 INFN Laboratori Nazionali di Troina
 INFN Laboratori Nazionali di Valle Aurada
 INFN Laboratori Nazionali di Frascati
 INFN Laboratori Nazionali di Legnaro
 INFN Laboratori Nazionali di Pisa
 INFN Laboratori Nazionali di Roma
 INFN Laboratori Nazionali di Troina
 INFN Laboratori Nazionali di Valle Aurada
 INFN Laboratori Nazionali di Frascati
 INFN Laboratori Nazionali di Legnaro
 INFN Laboratori Nazionali di Pisa
 INFN Laboratori Nazionali di Roma
 INFN Laboratori Nazionali di Troina
 INFN Laboratori Nazionali di Valle Aurada

From BNL To FNAL

$a_2^{\text{th}} = a_2^{\text{QED}} + a_2^{\text{had}} + a_2^{\text{weak}}$

$a_2^{\text{th}} - a_2^{\text{exp}} \sim 3\sigma$

Distribution System

Laser Calibration System

Multi-Laser driver

Light output

IFAE XV INCONTRI DI FISICA DELLE ALTE ENERGIE 2016

Dipartimento di Fisica
 Università di Genova
 30 Marzo - 1 Aprile
<http://ifae2016.ge.infn.it>

Comitato Organizzatore	Comitato Scientifico
C. Biggio	D. Bertini
B. Capraile	M. Caronera
G. Darbo	C. Bacci
G. Giamberini	G. Casali
G. Giamberini	G. Chianelli
M. Pallarini	L. Cosca
F. Perini	F. Ciampaglia
S. Panigada	P. De Fazio
E. Nelli	A. Di Cosimo
M. Tassi	F. Fabi
E. Zavattini	E. Falcioni
	F. Ferraro
	A. Malgara
	L. Meris
	S. Ruggieri
	D. Rocca
	B. Sella
	L. "Tardugno"
	A. Triossi
	V. Vignori
	F. Vissani
	A. Zecchi

Segreteria e Calcolo
 A. Brunetti, E. Carrara
 M. Conusio, D. Ferraro
 L. Orsini, M. Pavani

CAEN NATIONAL INSTRUMENTS HAMAMATSU

Dissemination, contributions to ICHEP 2016 major HEP conference

Posters on MUSE activities at the ICHEP 2016 conference, 3-10 August 2016

two MUSE PHD students presented posters at a major HEP conference in 2016

- ▶ 118. Study of the effect of solenoid field uncertainties on the physics goals of the Mu2e experiment, Federica Bradascio (University of Pisa)
- ▶ 1620. The track reconstruction software and performance studies of the Fermilab Muon g-2 straw tracking detectors, Tom Stuttard (UCL)

Deliverables

- D5.1, Sep 2016** HZDR outreach activities report **delivered**
- D5.2, Oct 2017** Experiments prepared for the LNF three-day event for high school teachers
- D5.3, Apr 2018** Masterclasses for high-school students, with tour of the laboratory facilities and hands-on measurement using prototypes of the $g-2$ straw trackers
- D5.4, Aug 2019** FNAL Summer School. Three-day training on the MUSE research activities for all the students of the FNAL European Master Degree
- ▶ August 2016, one-day of seminars on Muon $g-2$ for FNAL Summer students
 - ▶ August 2016, guided tour of 30 students to the UK Muon $g-2$ laboratory
- D7.3, May 2016** MUSE web site, **delivered**, both for general public and for MUSE participants
- ▶ belongs to WB 7 but is related also to WP 5
 - ▶ web site is being updated with outreach and dissemination activities

Summary

- ▶ outreach and dissemination of MUSE activities are proceeding according to plans