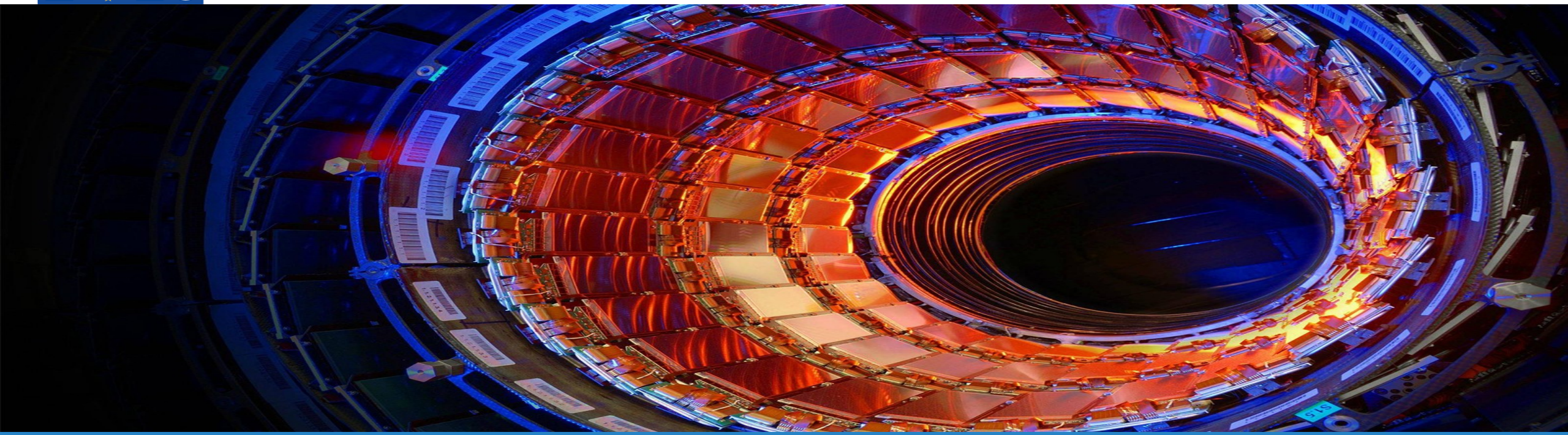

NA6 - LatticeHadrons network - progress report

Presented by Mike Peardon, Trinity College Dublin

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 824093

Overview

- Lattice Quantum Field theory well represented in Europe across about 40 institutions.
- Lattice QFT provides a non-perturbative, first-principles method for calculating properties of quantum field theories using Monte Carlo method to estimate the lattice path integral.
- Monte Carlo method requires large-scale computing resources for statistical precision so lattice practitioners have been closely involved with development of high-performance computing hardware and software systems.
- Aim of LatticeHadrons network is to
  - Foster connections between lattice groups
  - Build new connections between lattice theorists and other theory/phenomenology expertise across Europe
  - Build new connections between lattice theorists and hadron physics experiments
  - Enhance connection and access to Exascale HPC resources (EuroHPC)

EuroHPC


EuroHPC
Leading the way in European Supercomputing
The EuroHPC Joint Undertaking is a joint initiative between the EU, European countries and private partners to develop a World Class Supercomputing Ecosystem in Europe.

Plan:

1 Work performed from the beginning of the project to the end of the period covered by the report and main results achieved so far

- Successfully **hosted two workshops**
- **Helped the foundation of EuroLat consortium** to co-ordinate exascale HPC access

2 List of the Deliverables and Milestones achieved

- Deliverables in original plan (due Month 18) were reports describing outputs from workshops that have been postponed due to the pandemic.

3 Progress beyond the state of the art, expected results until the end of the project and potential impact

- Useful progress in co-ordinating European exascale lattice QFT computations.

SM&FT workshop – Bari 11th-13th Dec 2019

- Meeting held in Bari and co-ordinated by INFN including STRONG-2020 participants
- 98 attendees
- Meeting part of a series started in 1988 and intended as a cross-fertilisation of ideas coming from Statistical Mechanics, non-perturbative field theory and other areas of theoretical physics.

https://agenda.infn.it/event/17130/

Town-Hall meeting – Dublin, 5th-6th March

European lattice community HPC access town-hall meeting

5 Mar 2020, 09:00 → 6 Mar 2020, 13:30 Europe/Dublin

Salmon lecture theatre (School of Mathematics, TCD)

Description To remain competitive, scientific communities require access to Tier-0 resources adapted to their needs. EuroHPC presents an opportunity for PRACE to further serve science by establishing a new community access mode in addition to the existing resource allocation modes. Towards this goal, the PRACE council established a working group to produce a PRACE white paper on community access.

Lattice QCD is proposed as one of the communities that needs large computational resources. In order that the European lattice QCD community benefits from community access we need to co-ordinate our activity and be properly represented. The meeting, open to all in the European lattice community with interest in large-scale numerical simulation aims to start a broad discussion of the opportunities EuroHPC creates and how to best organise to maximise the benefits of Exascale for our scientific projects.

The workshop is supported by the LatticeHadrons network of the STRONG-2020 Integrating Activity for Advanced Communities.

Anyone interested is welcome to attend. There is no fee for attendance. Please register using the link below if you intend to come to the meeting.

As the meeting is taking place during the teaching semester, on-campus accommodation is limited. The College is located in the centre of Dublin so there are many hotels close to the campus. A few suggestions are listed here. Frequent buses to the city centre run from the airport.

Online participation is available in a zoom meeting

- Meeting hosted by Trinity College Dublin in March to co-ordinate access by the lattice QFT research community across Europe to planned Exascale resources.
- Online participation facilitated
- Invited external speakers:
  - Serge Bogaerts (PRACE)
  - Pier Luigi Vidale (Climate modelling)
  - Evangelia Markidou (EuroHPC)
  - Claus-Axel Mueller (EuroHPC – INFRAG)
  - Andreas Kronfeld (USQCD)

Town-Hall meeting – Dublin, 5th-6th March

- 30 participants (Italian colleagues joined remotely)
- Resulted in foundation of EuroLat consortium.
- A report on the meeting was contributed to the first STRONG-2020 newsletter

Workshops – postponed

- Two workshops were planned for this reporting period:
  - Regensburg
  - INFN
- In response to the pandemic, they have been postponed.
- Physical meetings are still the preferred option as the aim of these meetings was to build new interactions and collaborations between lattice practitioners and experimental and phenomenology expertise in STRONG-2020
- Updated plan will host the meetings in Summer 2021 and beyond, as travel restrictions permit.

Work package number	17
Work package acronym	LatticeHadrons
Work package title	NA6-Hadron physics from lattice quantum field theory

TASKS/Subtasks	**Year 1**				**Year 2**				**Year 3**				**Year 4**			
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
1. Workshop on spectroscopy and structure																
1.1 Host workshop				1												
2. Workshop on hadrons under extreme conditions																
2.1 Host workshop				2												
3. Workshop on hadrons in the Standard Model and beyond																
3.1 Host workshop								3								
4. Workshop on algorithms and computing for lattice hadron physics																
4.1 Host workshop												4				
5. Building European collaborations with lattice hadron physics researchers																
5.1 Prepare white paper outlining new research opportunities												5				

Workshop timetable – post-pandemic plan

- As soon travel is possible again, the four proposed workshops will be rescheduled.
- Our tentative plan is:

Host	Topic	Proposed date
Regensburg	Hadron structure & spectroscopy	Sept/Oct 2021
INFN	Matter at extreme temperatures and density	March 2022
Madrid	QFT beyond the Standard Model	April 2022 (connect to EuroPLEx meeting?)
Edinburgh	Algorithms & software for lattice quantum field	Winter 2022

Summary

- Network activity disrupted by COVID-19 pandemic. No travel / exchanges since March 2020 and all planned flagship workshops postponed.
- Deliverables (reports based on outputs of meetings) will be delayed.
- Support for SM&FT meeting in Bari (Dec 2019)
- Hosted lattice QCD town-hall meeting in Dublin (Mar 2020), which resulted in successful foundation of Europe-wide coordinating consortium.
- Discussion of online colloquia / seminars as alternative means of networking activity.
- Connecting LatticeHadrons with other planned online meetings to foster new connections.