# Workings of WG1 with some special

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#### 2021 July 15th





#### Contents

- Activities in Working Group no. 1
- Symmetry Special Issue "Higher Order Radiative Corrections in QCD"



• Only took over the steering of WG1 on 24th February

#### Objectives:

Development of innovative cutting edge algorithms to push the precision frontier forward, development of computational tools, computer algebra implementations, and proof-of-concept computations.

#### Tasks:

- Novel computer algebra algorithms to achieve efficient analytical simplifications. Properties of new special functions
- Factorisation properties of Yang-Mills theories and connection with gravity through the colour-kinematics duality
- Master integrals for multi-leg multi-loop scattering amplitudes
- Four-dimensional regularization and renormalization algorithms, generalized unitarity and eikonal methods
- Standardisation of new computational methods at NNLO and beyond



- Due to the pandemic all events went zoom
- Some got cancelled
- No STSM
- STSMs just got started (me being one of the guinea pigs)
- Particle physics community is honest: no fees for virtual events
- High hopes for going real life early next year
- Not too much time left of the action (finishing end of October)



Several activities happened or are to happen related to WG1 (tentative):

#### CAPP 2021:

- 99 participants
- 5 expert lecturers
- Fully virtual
- Even with gather.town





#### RadCor & LoopFest:

- 286 participants
- 117 talks
- Fully virtual





New Physics from Precision at High Energies (Precision21)

- Organized via KITP at Santa Barbara
- 190 participants
- 20 talks
- Fully virtual





#### Future conferencies are planned as well, like:

#### Matter To The Deepest 2021

- 15-17 September, 2022
- In Katowice, Poland
- Virtual event





#### Loops and Legs 2022

- 25-30 April, 2022
- In Ettal, Germany
- Planned as a live event!





- The pandemic had a lethal blow at workshops and conferences
- One possible measure of scientific activity is the number of papers put online
- To gauge the effect of scientific activity analysed the publishing tendencies:
  - Number of papers published at arXiv
  - Using the hep-ph category (with cross referenced papers)
  - No restriction on number of authors (big collaborations are also considered)
  - Yearly and monthly data were considered







- The conference scheme changed
- Workshops went "zoom" or extinction
- The community is still alive and kicking
- The publishing attitude is positive and skyrocketed
- For administrative discussions zoom seems a better choice
- Zoom cannot replace creative workshops
- This COST action is also contributed to this tendency:
  - Action report surfaced as a Symmetry special issue



## Symmetry Special Issue "Higher Order Radiative Corrections in QCD"

Guest edited by: Zoltán Trócsányi, Giuseppe Bevilacqua and AK

- Last February got contacted by Symmetry for a special issue on QCD
- Covid happened
- Networking events got cancelled and went on-line
- ⇒ Changed strategy to make it a report for PARTICLEFACE
  UNIVERSITY of
  DFBRECEN

#### Message from the Guest Editors

As QCD processes are ubiquitous in hadron collisions, such progress is indispensable in order that the accuracy of the theoretical predictions meet the requirements of experimental precision at the LHC. Clearly, the range of contributions relating to precision QCD is broad and highly specialized. Hence a Special Issue of review articles as well as <u>original contributions that collects the state of the art</u> about these topics with emphasis on comprehensiveness and methodical detail is timely and can be highly beneficial to foster further progress.

Symmetry is the underlying concept in the theoretical description of fundamental interactions. It is especially true in the case of strong interactions whose development has relied heavily on observing exact and approximate symmetries in hadronic systems. Exploiting the various symmetries present in the theory of QCD facilitates finding solutions to the highly complex dynamics.

- Making it a report for PARTICLEFACE meant a change in scope but did it for good reason
- Looked forward contributions from all the Working Groups of the Action
- COST is all about collaboration  $\Rightarrow$  emphasized teaming up with different nodes
- With neworking events being cancelled COST budget could not be used
- Symmetry is open-access  $\Rightarrow$  publication fee is required
- PARTICLEFACE provided the financial support for publishing the report



- Received 9 contributions
- All of them are accepted for publications
- All of them are available on the symmetry website
- They are from 13 countries:
  - 8 in the EU, 3 in the Americas, 2 from Asia
- 19 different institutes
- written by 33 people



#### The contributing countries:





Contributing countries in the EU:





#### COST is all about connections:





The special issue contains contributions from many different areas:

- Jet substructure
- BSM physics
- Standard model probes
- QCD and QED corrections
- Novel techniques for radiative corrections
- Regularization techniques in QFT
- Probing hadrons with photons



- Quality and quantity of contributions greatly exceeded our expectations
- Interaction with the Publishing House was flawless and they were flexible
- Thanks to all the contributors for their work
- Thanks to the action for the financial support



## Thank you for your attention!