

## Questions and answers - Aida El-Khadra Lecture

The following questions were submitted through Google Form. Some / all may have been answered in the Q&A session already. Nevertheless, we request our lecturers to provide written answers here for the benefit of those who could not attend that session. Thank you!

Page 10. What are the differences between the different lattice calculation? Do the error bars reflect only statistical errors or other effects as well?

The lattice QCD calculations shown in the plot are independent, having been obtained from gauge-field ensembles that were generated by that particular collaboration. The error bars are inclusive of systematic errors.

Page 20. Does quantum computing offer any significant advantages over classical computing for lattice calculations?

Not in the near term for QCD. In the long term, quantum computing holds the promise of providing quantitative information on "QCD under extreme conditions" which is not accessible to classical computations. The following paper provides a summary of current efforts and a roadmap towards quantum computing for HEP: [2204.03381](#)

Page number not specified. How do the PDF from lattice calculation compare with those from experiments? Are they "better" in certain regimes? Can / should they be used in Monte Carlos for example? .

Lattice QCD calculations of PDFs (and related quantities) are quickly maturing, thanks to dedicated efforts by the international lattice community. The most useful constraints from lattice calculations will likely be obtained for regions of phase space or (flavor,spin) contributions not easily accessible in experiments. For a summary of the current status and future prospects, see the recent plenary talks at the [Lattice 2024 conference](#):  
[2024.0728\\_Lattice2024\\_tjhou.pdf](#)  
[LQCD24\\_SB.pdf](#)  
[Mukherjee.pdf](#)

Page 18. Can you give more details on how the EFT of photon is constructed?

The most common FV EFT is Chiral Perturbation theory (ChPT), which is a theory of pions (or pions and kaons). To include photons (QED) into ChPT, one starts with scalar QED. An example of how this approach is used to analyze FV effects in the presence of photons is described in: [1903.10591](#)