Questions and answers - Wolfgang Altmannshofer Lecture 2

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!

Slide 47. Question about EW correction factor eta_EW. Many lectures have used a power series in inverse mass scale. Is that also the case here?

The eta factor comes from higher order corrections in the electroweak interactions.
It corresponds to a loop expansion in coupling constants, symbolically something like
1 + O(alpha/4pi) + O(alpha^2/(4pi)^2) + ...

Slide 49. Why do the FNAL/MILC points have so much smaller uncertainties?

Here are the links to the papers.
HPQCD https://arxiv.org/abs/1505.03925
Fermilab/MILC: https://arxiv.org/abs/1503.07237

We would need a lattice expert to guide us through all the details of those papers.
One immediate difference I see is that Fermilab/MILC use 4 different lattice spacings with the finest lattice having a spacing of 0.045 fm.
HPQCD only used 2 lattice spacings with the finest at 0.09 fm.

I imagine that this is one of the reasons why Fermilab/MILC has higher precision.

Slide 57. Can the decay constants be measured? If so, how do they compare with the lattice results?

To measure the Bs decay constant one needs a leptonic decay of the Bs. The most promising would be Bs -> mu mu. If one *assumes* that Bs -> mu mu is not affected by any new physics one could turn the Bs -> mu mu measurement into a measurement of the decay constant. (But it would not be very precise.)

To get the B+ decay constant one could use B -> tau nu (challenging experimentally) or B -> mu nu (low rate). Also here I would not expect very high precision.
In principle, one could then turn the B+ decay constant into a Bd decay constant using iso-spin symmetry.