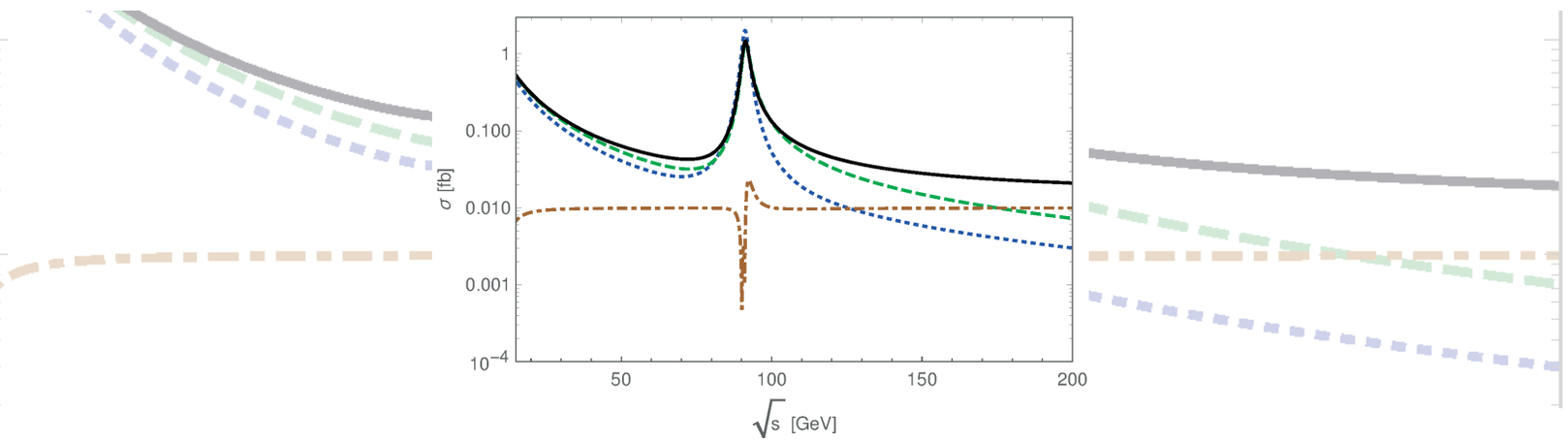
PHYSICS COLLOQUIUM.



The effects of $O(\alpha^2)$ initial state QED corrections to $e^+e^- \to \gamma^*/Z^*$ at very high luminosity colliders

Prof. Johannes Blümlein | DESY

5 February 2020 | 14:00
DESY | Zeuthen | Platanenallee 6 | SR 3

We present the recently completed $O(\alpha^2)$ initial state corrections to the process $e^+e^- \to \gamma^*/Z^*$, which is a central process at past and future high energy and high luminosity colliders for precision measurements of the properties of the Z-boson, the Higgs boson, and the top quark. We observe differences to an earlier result in the non-logarithmic contributions at $O(\alpha^2)$. The new result leads to a 4 MeV shift in the Z width considering the lower end $s_0 = 4\ m^2_\tau$ of the radiation region, which is larger than the present accuracy. We present predictions on the radiative corrections to the central processes $e^+e^- \to \gamma^*/Z^*$, $e^+e^- \to Z\,H$ and $e^+e^- \to t\bar{t}$ planned at future colliders like the ILC, CLIC, Fcc-ee and CEPC to measure the mass and the width of the Z boson, the Higgs boson and the top quark, for which the present corrections are significant.

Deutsches Elektronen-Synchrotron DESY
A Research Centre of the Helmholtz Association