

Minutes of WP-meeting 383

Attendance:

Zoom: Paul Colas, Ralf Diener, Ulrich Einhaus, Keisuke Fujii, Jochen Kaminski, Claus Kleinwort, Jurina Nakajima, Huirong Qi, Manqi Ruan, Ron Settles, Jan Timmermans, Keita Yumino, Mingrui Zhao

News from the groups:

Keisuke presented a new distortion calculation for the Tera-Z option of a circular collider. He used the same methodology and programs as for the calculation for the ILC a few years ago. He explained in detail the idea behind the calculation starting with the Poisson's equation and the Green's function needed to solve the Poisson's equation. To reach a manageable equation some assumption were made, for example that the charge density ρ is independent of ϕ . The charge density of primary ions is extrapolated from 100 Z decay events to a 0.44 s time frame, which covers the drift time of the ions. The resulting electrical field is split thanks to the superposition principle into components parallel and orthogonal to the B-field.. Only the latter contributes to ExB effects and gives the relevant charge deviations. The E_r is maximal -7 V/m for small radii and +1.5 V/m for large radii resulting in distortion of up to 160 μm . These values are for an event rate of 50 kHz of hadronic Z-decays, an ion drift velocity of 5 m/s and primary ions + IBF=1. Daniel Jeans had shown a similar calculation, in the ILD Software and analysis meeting on the 23rd of November 2022

(<https://agenda.linearcollider.org/event/9876/contributions/51617/attachments/38548/60641/tpc-teraz-nov2022-jeans.pdf>), where he calculates the ion density from the full ILD simulation (including backgrounds) for the Tera-Z, reduced magnetic field etc. For IBF = 1 he gets a maximum distortions of 240 μm , which is quite similar to Keisuke's.

Keisuke's program to calculate the distortions from a given charge density distribution is uploaded to the WPmtg's indico page.

Paul showed some slides he had prepared for the French Italian FCC-meeting in Lyon. He concentrated on one slide, where colleagues from T2K had done a detailed study on the charge spreading with different parameters: A global fit of the wave forms of the leading pad and the 8 neighbors give access to the RC value (through the time development) and to the gain (through the amplitude). The gain map obtained by this method agrees with the direct measurement of the ^{55}Fe peak position.

AOB:

The next workpackage meeting will take place on December 8th.