

Minutes of Meeting, 2017-03-24

Working group on novel accelerator techniques

Minutes by Erik Adli

In general, the minutes will cover some key points from the discussion, and not all the details of the slides (available on indico).

Topic: Overview of Novel Accelerator Techniques

Speaker Patric Muggli

Patric gave an overview of the main novel accelerator technologies being pursued today. He divided them into two mediums, plasma and dielectrics, and two drivers, lasers and particle bunches. That makes four technology groups :

LWFA: laser driven plasma wakefield acceleration

PWFA: particle beam driven plasma wakefield acceleration

DLA: laser driven dielectric structures

DWA: wakefield driven dielectric structures.

For the latter, two different directions are being pursued:

* co-linear beam-driven DWA (SLAC and others)

* non co-linear TBA DWA (Argonne and others)

I will not try to make a summary of an overview with these minutes. Instead, I mention below a few of the topics that came up in discussions during the talk :

* DLA: what is the "rise time", number of EM-cycles, needed for the laser field being side-coupled into the structure, and in particular what implications are there for laser-to-beam efficiency ?

* Trojan horse "cold photocathode" injection into plasma: in principle electrons can be born at rest inside high accelerating field, potential for low emittance ?

* Break down rate: how to quantify limit in single-bunch operation mode

In general many questions can be raised for the different technologies (where answers may be available from external experts, or, need to be studied further - these are to be) :

* wake-to-beam efficiency for plasma (what is the relation between efficiency and BBU)

* similar questions DLA

* wall plug-to-laser efficiency for DLA and LWFA

* wake-to-beam efficiency for collinear DWA (low Q, high vg)

Key topics that needs to be studied further will be further identified, and then discussed in future WG meetings.

Next meeting (21/4, 2017)

Philipp Roloff will discuss various physics options for machines based on novel accelerator technologies (for example gamma-gamma collisions, boosted collisions and others), as well as detector and physics considerations for the time structure of the colliding beams.