

# Minutes 22<sup>nd</sup> AWAKE Run 2 Meeting, July 15<sup>th</sup>, 2020

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<https://indico.cern.ch/event/938900/>

**Zoom (18):** Jan Pucek, Giovanni Zevi Della Porta, Rebecca Ramjiawan, Patric Muggli, Steffen Doebert, Francesco Velotti, John Farmer, Allen Caldwell, Collette Pakuza, Luca Garolfi, Josh Moody, Linbo Liang, Livio Verra, Mariana Moreira, Nat - Peerawan Wiwattananon, Pablo Morales Guzman, Philip Burrows, Stefano Mazzoni, Valentin Fedosseev

## *Matters arising (Giovanni Zevi):*

This meeting and the next are moderated by Giovanni, as Edda is on vacation. The meeting started by dealing with minutes from the last meeting.

Membranes and foils testing with WDL is ongoing, right now they are obtaining them from the supplier. A minor change in material is presumed - SiC instead of SiN. Temperature cycling of the membranes will be tested at EHN1, while Rb tests will take place in Marburg. There is no progress yet on beam dumps. The possibility to add screens into the vapor source is still being studied.

John's simulations concerning the input parameters for the electron beam are ongoing. John is searching for a robust way of obtaining the values and trying two parameter sets (high and low density).

This time there will not be an integration part of this meeting (Ans is on vacation), but the discussion between all involved parties is progressing.

## *Status of proton and electron beamlines design (Rebecca Ramjiawan):*

Rebecca's presentation was divided into two sections: Proton line and electron line.

### **Proton line:**

The study of moving the vapor source 40 m downstream without adding magnets was done. The aperture constraints proved to be challenging, but Rebecca presented a solution with 1 mm clearance in the chicane dipoles (after taking into account all uncertainties and errors). The integration team will need to check conflicts with other components for the presented design. A detailed study will be needed in case we agree with the proposed solution. This new proposal will respect all power converter limits, although the dipoles will run closer to these limits than in Run1. The resulting position stability will be comparable to Run1 (actually better in x and worse in y w.r.t. Run1), and well within the 100  $\mu\text{m}$  bounds. A study of BPM integration will be carried out at a later stage.

There were several questions during the presentation:

**Steffen:** Is the vacuum chamber included in the aperture values? -> Rebecca will confirm

**Josh:** What are the expected radiation levels due to the small clearance and what errors were used? -> Six sigma should be enough in order not to be scraping magnets. Studies about radiations should be carried out. Concerning the quantification of errors – they are rather conservative, following what was done in Run1, as well as for LHC and SPS tolerances.

**Patric:** Is the laser system compatible with the 40 meters shift? – **Valentin:** A technical solution to make it work will have to be studied, no showstoppers have been found so far.

**Patric:** What is the emittance used for the simulations? -> For the envelope 3.5 mm mrad as in Run1.

**Patric:** with the 40 m shift, will there be galleries for OTR light transport, and space for a new streak room in TSG4? -> **Nat:** looking at drawings, there should be enough existing galleries between CNGS and TSG4

**Patric:** could we have soon a discussion about the electron/proton diagnostics for Run2a? -  
> Stefano will discuss this at the next meeting

### **Electron line:**

The electron beam is matched to the plasma if the effective emittance satisfies the condition shown on slide 14. Effective emittance is 10% larger than initial emittance due to dispersion, allowing a relaxed requirement on beam size. This statement was followed by a long discussion, see below. Particle-tracking studies produce gaussian beam profiles, and Rebecca mentions that larger emittances would run into the aperture of the magnets. Sensitivities to offsets with respect to the center of the beam are also studied. Next, requirements and effects of trajectory corrections will be studied.

Questions:

**Livio:** Why is effective emittance used? -> The effective emittance is a better description of the bunch since it is coupled to a distribution of particles. A longer discussion about which emittance should be used followed, the main question being what is most relevant for matching.

**John:** What will the pointing error be for the electron beam -> This will be addressed in upcoming studies

**Next time:** Diagnostics for Run 2a will be presented and discussed (Stefano and Michele). Potentially, John will give an update on simulations.

**Next meeting, Thursday, 30<sup>th</sup> July 2020, 14:00**

Jan Pucek, Jul 21<sup>st</sup>, 2020