Status Report on the DLA Experiments at the SINBAD/ARES Linac.

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Introduction

> The Accelerator on a Chip International Program (ACHIP) aims to demonstrate a working prototype of a particle accelerator on a chip until 2021
> DESY will conduct related test experiments at its SINBAD facility (ARES linac)
> Funded by the Gordon and Betty Moore Foundation

> Two main experiments have been internally proposed to be started beginning of 2020 [1]
> Stage 1: External injection of relativistic ultra-short single bunches into a grating-type DLA
> Stage 2: External injection of relativistic phase-synchronous optical scale microbunch trains

ARES Linac

Experimental Area 1

Matching Section (4 Quadrupoles)

Experimental Chamber and Target Platform

Sample holder / laser design by Bencik / Herrmann (FSL, Switzerland)

Experimental Chamber

1. Custom T-alignment screws ordered
2. Supports being designed by DESY engineers

Experimental Area 1

Status

DESY, Hamburg, Germany, I.

I. Equipment for stage 1 experiments
   • First tests at DESY test beam line planned
   • External injection of relativistic ultra-short single bunches into a grating-type DLA
   • To be installed during the week of this conference
   • To be installed at ARES cathode laser lab
   • Laser beam line measured from VAD
   • Vacuum transport beam line installation during the week of this conference

Selected Components and Status

Undulator and Chincan (Microbunching Setup)

Experimental Chamber

Parameter

Value

Tube Length (m) 1488.5
Tube Diameter (mm) 3.5
Beam Diameter (mm) 3.5
Entrance Angle (deg) 14
Exit Angle (deg) 16
Centerline (mm) 30
Tube Length (mm) 148850

High-Sensitivity Detector (STRIDENAS)

Parameter

Value

Beam quality 1.8
Microbunching (ps) 1
Amp. bunch density 1
Synchrotron radiation (eV) 1
Bunch density (ps) 1
High-gain detection 1
High-energy spectrometer dipole already in the tunnel

Table 6.4

<table>
<thead>
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<td>Fixed gap design based on PETRA U2G</td>
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<tr>
<td>Built by UHH workshop</td>
<td>✓</td>
</tr>
<tr>
<td>Magnets and poles (VAC) already at DESY</td>
<td>✓</td>
</tr>
<tr>
<td>Custom T-alignment screws ordered</td>
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<td>Supports being designed by DESY engineers</td>
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Table 6.6

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This work was supported by the Gordon and Betty Moore Foundation under grant GBMF4744 (Accelerator on a Chip).


Figures:

- Fig 1. Alignment Channels
- Fig 2. ARES Linac
- Fig 3. DLA Laser
- Fig 4. High-Sensitivity Detector (STRIDENAS)