First Prototype Undulator for the LCLS Project – Mechanical Design and Prototype Lessons*

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Abstract

The design of a new hybrid-type undulator with a fixed gap of 6 mm, a period of 30 mm, and a length of 3.4 m is presented. The undulator line, consisting of 33 such units, is a critical part of the LCLS project, which is one step toward the design of a fourth-generation synchrotron radiation source. Magnetic uniformity of all 33 undulators, as well as the corresponding mechanical uniformity, is a major challenge. A ridged C-shape design with a titanium housing of 12" diameter was chosen to provide easy access to the gap area for magnetic measuring and tuning. Lessons we learn while working with this prototype are very important and critical for successful project execution. Results of the assembly and tests and possible design changes are presented.

Keywords: hybrid undulator, synchrotron radiation, SASE

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