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Vibration Measurements of the Wire Scanner for the SwissFEL[1]
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The SwissFEL is an X-Ray ($0.1nm - 7nm$) Free Electron Laser user facility which is being planned for the Paul Scherrer Institute in Switzerland. At the SwissFEL, view screens will be used to monitor the transverse profile of the electron beam. Wire scanners are also to be employed as the high beam densities of the electron beam will hamper the standard diagnostics. Wire scanners will be tested on the $250MeV$ SwissFEL Injector Test Facility with a $200pC$ electron beam whose transverse diameter is typically about $100\mu m$. The portion of the electron beam that is unscattered from the wire will be measured to determine the beam loss. The wire scanner is driven by a stepper motor and the wire position is obtained using a digital encoder. The wire scanner may be susceptible to vibrations which may lead to erroneous encoder positions. The variation in position of the wire, with the motor being driven at a number of different speeds, was studied using a concentrator back-light and a 1MPixel high speed camera. The camera was triggered using the $10Hz$ SwissFEL Injector Test Facility timing signal. A typical vibration with an amplitude of about $0.5\mu m$ was observed. Dependence of vibration of the wire on the motor driving speed and ways of optimizing the operational parameters.

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[2]Swiss Free Electron Laser

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