Design Document of Sandbox Undulator

# Contents

# Introduction

This report is a procedurally generated document for an undulator design. This undulator is a Cryogenic Compensated Tilted APPLE II device, with a period length of 15 mm, designed for a minimum magnetic gap of 2 mm.  
The key parameters for this device are listed in Table 1, and the complete device description saved in XXX is shown in Appendix 1.

|  |  |
| --- | --- |
| Parameter | Value |
| origin | [0. 0. 0.] |
| coordinate\_names | ['X' 'S' 'Z'] |
| pointsperperiod | 20 |
| block\_subdivision | [1, 1, 1] |
| type | Cryogenic Compensated Tilted APPLE II |
| beams | 2 |
| quadrants | 4 |
| rows\_per\_quadrant | 3 |
| rows | 12 |
| periods | 4 |
| minimumgap | 2 |
| gap | 5.0 |
| shim | 0.1 |
| periodlength | 15 |
| secondperiodlength | 15 |
| thirdperiodlength | 15 |
| halbach\_direction | 1 |
| magnets\_per\_period | 6 |
| rowtorowgap | 0.5 |
| shiftmode | circular |
| rowshift | 7.5 |
| jawshift | 0 |
| end\_separation | 2.5 |
| compappleseparation | 7.5 |
| square\_magnet | False |
| nominal\_fmagnet\_dimensions | [20.0, 2.4, 20.0] |
| apple\_clampcut | 5.0 |
| magnet\_chamfer | [5.0, 0.0, 5.0] |
| direction | y |
| nominal\_cmagnet\_dimensions | [15.0, 2.4, 30.0] |
| comp\_magnet\_chamfer | [5.0, 0.0, 5.0] |
| nominal\_hcmagnet\_dimensions | [7.5, 2.4, 15.0] |
| hcomp\_magnet\_chamfer | [5.0, 0.0, 5.0] |
| nominal\_vcmagnet\_dimensions | [15.0, 2.4, 15.0] |
| vcomp\_magnet\_chamfer | [5.0, 0.0, 5.0] |
| ksi | [0.019, 0.06] |
| M | 1.6262400000000001 |
| Mova | 0 |
| totalmagnets | 25 |
| end\_magnet\_thickness | [1.775] |
| magnet\_material | <wradia.wrad\_mat.wradMatLin object at 0x000001D82545D710> |
| magnet\_rows | 12 |
| key | 1.6262400000000001 |
| name | Sandbox Undulator |

# Magnetic Field Summary

This device is a polarising device, and the peak magnetic field achievable is 1.550 T vertical field (horizontal polarisation), and 1.587 T horizontal field (vertical polarisation). The corresponding K values can be seen in Table 2. The variation of this peak field with gap and shift is shown below in Fig. 1 and Fig. 2. Plots of the field at minimum gap in horizontal and vertical polarisation modes are shown in Fig. 3 and Fig. 4.



