

# SAIP2014



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## **Towards a crystal undulator**

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### **Abstract :**

SH Connell, Jürgen Härtwig, Dazmen Mavunda, Thu Nhi Thran ThiThe CUTE FP7 project proposes to produce ultimately a MeV range gamma ray laser by the FEL principle in a crystal undulator. The GeV range electron beam would need to be captured in a high index crystallographic channel of a crystal superlattice, in such a way that the varying electrostatic crystalline field would resemble a Tesla range periodically varying magnetic field with a few micron pitch, when viewed in the reference frame of the undulating electron or positron. We have investigated a prototype diamond superlattice using x-ray diffraction topography. The undulator fabrication principle involved CVD growth of diamond on a diamond substrate while varying the concentration of boron in the gas phase during growth. This should lead to the periodic variation of the lattice dilatation by the varying concentration of the single substitutional boron impurity atom. The validation via x-ray diffraction topography proved non-trivial but was eventually promising.

### **Award :**

No

### **Level :**

N/A

### **Supervisor :**

N/A

### **Paper :**

Yes

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