

Development and characterization of CVD diamond neutron detectors

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Permanent staff

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- Microwave-CVD single-crystal diamond growth
- Diamond characterization
- Device fabrication
- Electronic characterization
- Detector characterization

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- Neutron irradiation
- Neutron detectors characterization

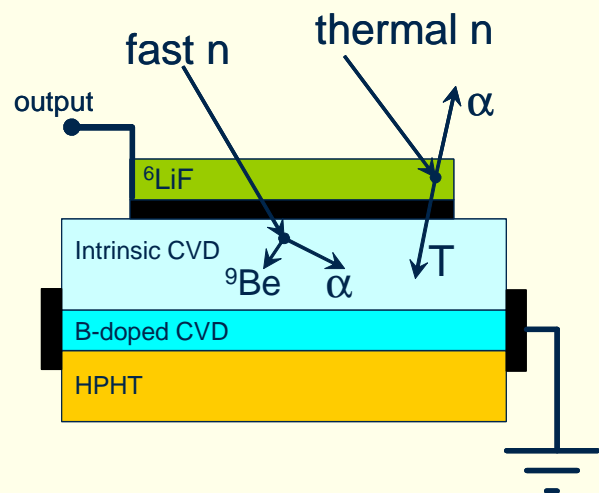
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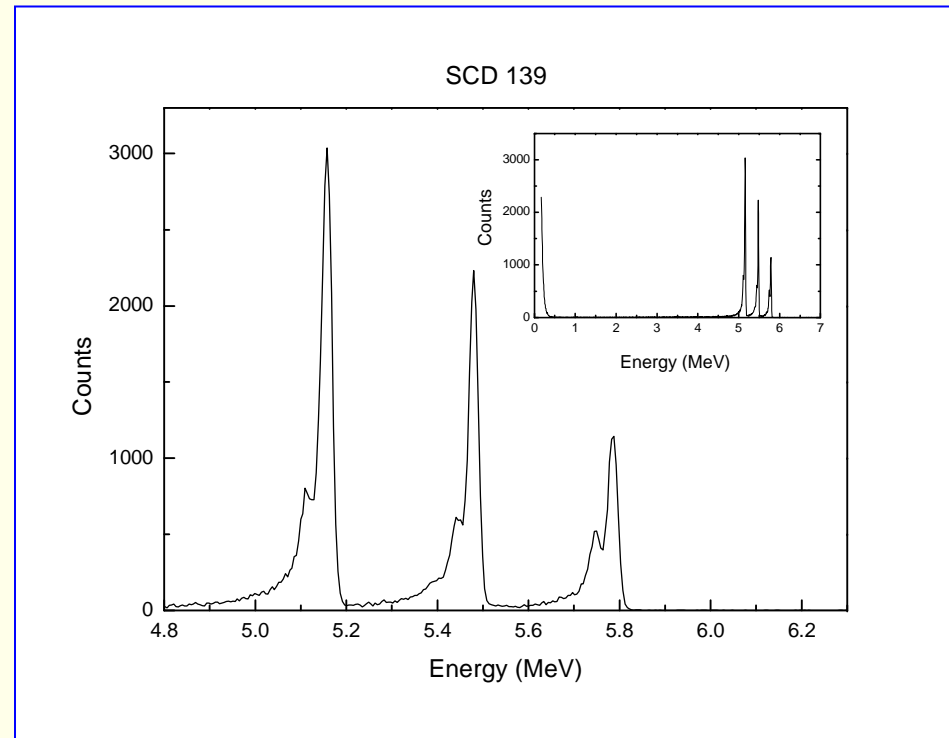
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Development and characterization of CVD diamond neutron detectors

- ✓ Reproducible fabrication process
- ✓ All samples show 100% CCE and resolution in the range 0.4-1.5%
- ✓ No priming effects
- ✓ No polarization effects at high count rates
- ✓ 14 MeV neutron radiation hardness $>2 \cdot 10^{14}$ n/cm²



Triple α source (²³⁹Pu, ²⁴¹Am, ²⁴⁴Cm) irradiation



Diamond-based neutron detector
for thermal and fast neutrons



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1.1.2009 – 31.12.2009

Optimization of the fabrication process
Detectors characterization
Tests under 14 MeV neutrons

1.1.2010 – 31.12.2010

Optimization of the fabrication process.
Reproducibility of the neutron detection
properties evaluation: All the fabricated samples shall show energy resolution below 5% for fast neutrons and 100% charge collection efficiency with no memory effects.

1.1.2011 – 31.12.2011

Radiation hardness tests

1.1.2012 – 31.12.2012

Increase of the detector sensitivity. Higher sensitive volume. Effects of Diamond and ^6Li or ^{10}B thickness study.
Development of fast electronics..

1.1.2013 – 31.12.2013

Final prototypes. Tests under high fluxes.

Costs estimate

		Full Costs	co-financed by the EC (75%)
Personnel	Month		
	Full Prof.	4	24000
	Ass. Prof.	4	16000
	Researcher	5	15000
Equipment		0	0
Consumables		20000	15000
Travel		15000	11250
Subcontracts		15000	11250
Total Direct Costs		105000	78750
Overhead		63000	47250
Total cost of the RTD		168000	126000

