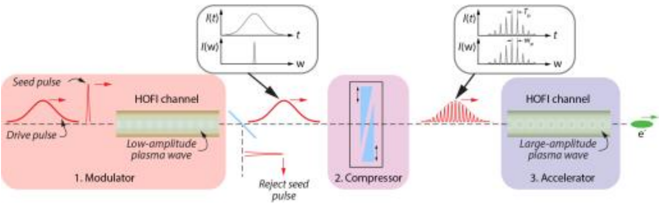
PROJECT NUMBER

**18327**

# A compact, high-repetition rate laser-driven plasma electron accelerator

A compact, high-repetition rate laser-driven plasma electron accelerator.

**Applications:** Medical imaging, radiotherapy, material inspection, security screening, production of secondary particles (positrons, neutrons, muons etc.)




| Features | Benefits |
|---|---|
| Potential to achieve very high electron beam energies (100 MeV to multi-GeV) in a compact space using “off-the-shelf” industrial lasers | More powerful and efficient system compared to existing technologies |
| Approach allows the use of new industrial-strength laser technologies (e.g. thin-disk lasers) which can generate laser pulses with high efficiency (> 10%) and at high repetition rates (1 – 10kHz) | Compare favourably to currently-used Ti:sapphire lasers which have very low efficiencies (<0.1%) and (at these pulse energies) are limited to pulse repetition rates below 10Hz |
| This plasma accelerator could be located in the user’s lab and might even be transportable | The higher repetition rate could offer higher particle and radiation fluxes and be more stable than other laser-driven plasma accelerators |
| Can generate femtosecond-duration electron bunches synchronized to short-pulse laser | Much less space required compared to conventional RF accelerators; Brings costs of system down |

| Features | Benefits |
| --- | --- |
| Includes a method for converting with high efficiency the long pulse into a train of short (~ 10 fs), equally-spaced (~ 100 fs) pulses | Ideal for driving tunable Compton X-ray sources; Small X-ray source size enables high resolution imaging |
| | Oxford team has demonstrated experimentally that trains of laser pulses can resonantly drive a GeV-scale plasma accelerator stage; Further experiments underway |

## Patented and Available for

- Co-development
- Consulting
- Licensing

To find out more, contact enquiries@innovation.ox.ac.uk and quote the project number.