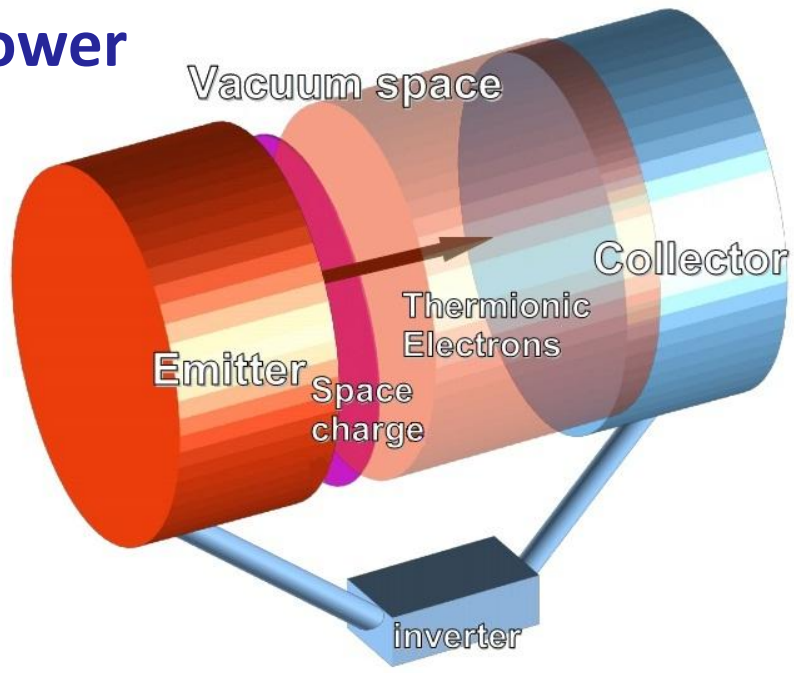
University of BRISTOL

Lithiated Diamond Nano Particle Energy Converter

Concentrated Thermal to Electrical Power

- ❑ Hermetically sealed vacuum package
- ❑ Composed of glass envelope and composites electrodes
- ❑ Similar fabrication techniques as light bulbs and electronic valves
- ❑ A low voltage, high current device
- ❑ Configured as a series/parallel array mounted at the focus of the concentrator
- ❑ Initial testing on hot plates and small solar dish concentrators



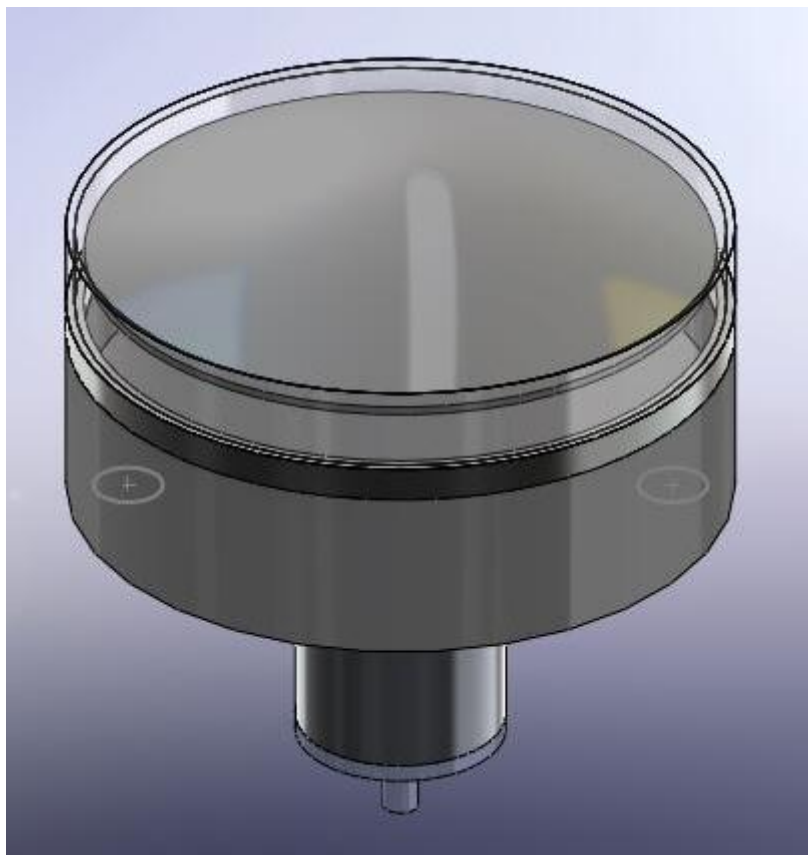
Carnot Efficiency for a Heat Engine

$$1 - \frac{T_c}{T_e} = Carnot\ \ efficiency$$

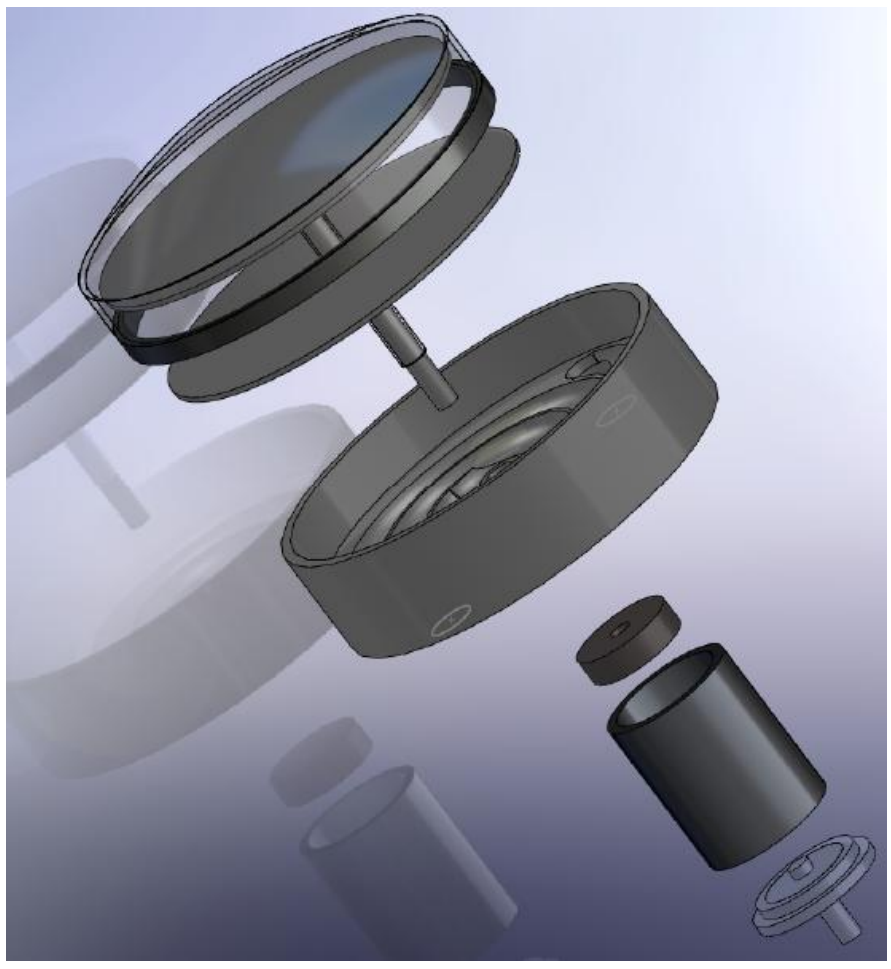
Converter efficiency – Target >25%

Dependent on temperature difference between emitter & collector electrode and material work-function.

Prototype TDC Design



The TDC physical size and power rating are scalable from a small diameter to a length/diameter ratio suitable for trough type solar concentrators. Larger diameter TDC geometries can be used with utility sized parabolic dish concentrators.



Milestone 5: Thermionic Diamond Converter (TDC) operating in the STR

This represents the first ‘on-sun’ trials of TDC fitted into a dish concentrator, selected from the best TDC prototypes and electrode pairs of WP4. This first device will be designed to allow the TDC emitter & collector electrodes to be replaced allowing new materials from WP1 & 2 to be quickly assessed under real operating conditions.