SCIENCE UP CLOSE

Particle Physics

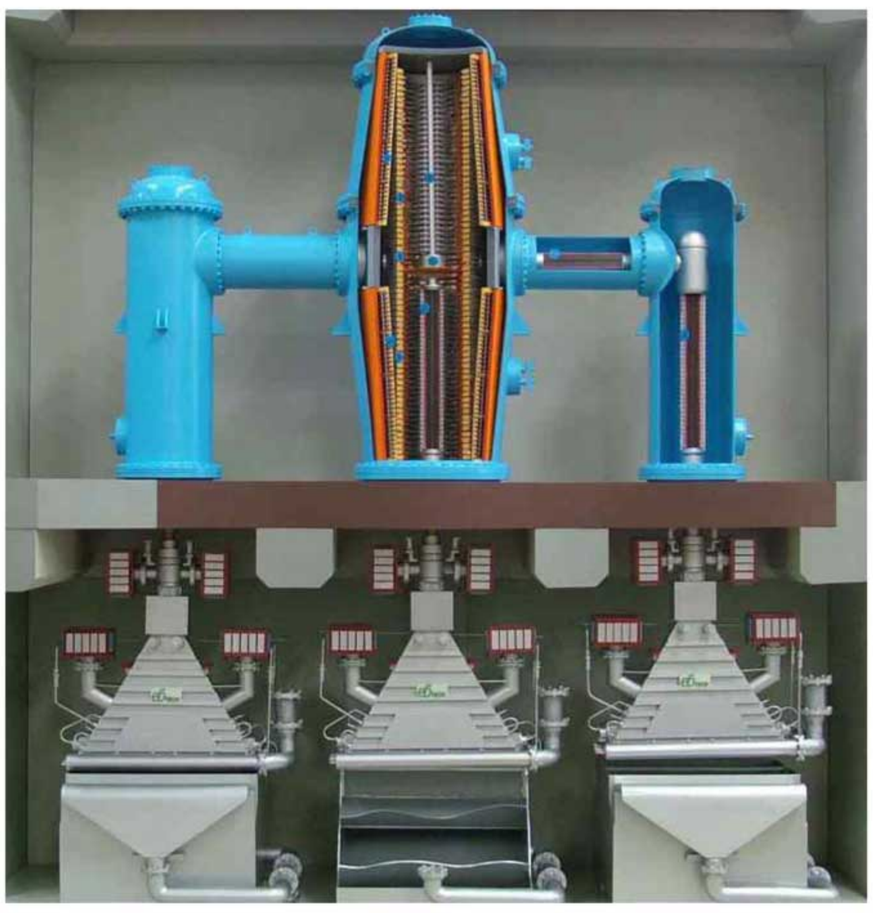
STFC Rutherford Appleton Laboratory

Particle Accelerators: What are they good for?
Environmental Applications.

This a new and developing area of accelerator applications. Uses being studied include the reduction in acid rain from flue gases, the treatment of water, the conversion of farming waste into biofuel and removing pathogens from seeds.

Water treatment

Water treatment is used to remove harmful impurities, pathogens and colours and smells. Typically this is done chemically, but there are many cases where this is not possible, in particular in developing countries, when there is large local contamination and preventing organisms being transported in the ballast water of ships. In these cases, it is possible instead to use small electron accelerators.



A facility in Korea used for removing dye from waste water

We are part of a European project to study water treatment in the developing world using mobile electron beams.

Treating flue gases

Here, electron beams are used to remove NO_x and SO_2 from flue gases, particularly from power stations, to reduce acid rain. There are a number of advantages in this technique over the chemical method currently employed.

Electron beam tests at a power station in Poland. (Right) accelerator; (above) beam delivery.

Tests with a mobile unit.

Biofuels

Electron beams have great potential for creating biofuels from waste vegetable matter. They are used to aid the breakdown heavy molecules into lighter molecules which can be used as fuel.

Removing pathogens

As well as water, electron beams can be used to treat medical equipment, seeds and even food.

Electron beam facility in Germany for treating seeds