RAL

DESIGN & DISCOVERY

Open Days July 1990

RUTHERFORD APPLETON LABORATORY

SCIENCE AND ENGINEERING RESEARCH COUNCIL

KARLSRUHE RUTHERFORD MEDIUM ENERGY NEUTRINO EXPERIMENT

Kernforschungszentrum Karlsruhe
Universität Karlsruhe
Universität Erlangen

Rutherford Appleton Laboratory
Queen Mary & Westfield College
Oxford University

KARMEN

AN EXPERIMENT TO INVESTIGATE THE PROPERTIES OF NEUTRINOS AND THEIR INTERACTION WITH MATTER.

IF NEUTRINOS ARE NOT MASSLESS LIKE PHOTONS THEY CERTAINLY ARE THE LIGHTEST KNOWN ELEMENTARY PARTICLES. YET DUE TO THEIR HUGE NUMBER THEY WILL REPRESENT THE DOMINANT PROPORTION OF MASS IN THE UNIVERSE IF THEY ARE FOUND TO BE MASSIVE PARTICLES AFTER ALL.

DETECTOR :

KARMEN IS A 65 000 LITRE SCINTILLATOR DETECTOR

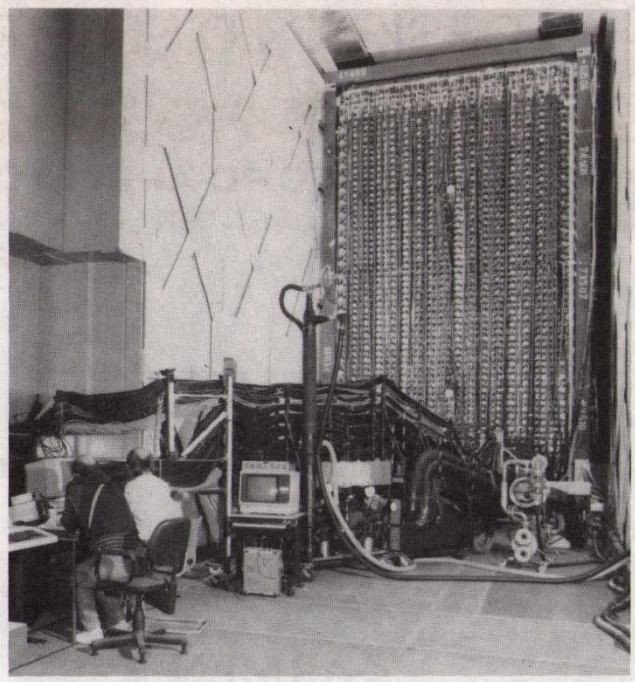
ALMOST **7m** HIGH, **4m** WIDE, AND **4.8m** LONG ITS TOTAL WEIGHT AMOUNTS TO 300 TONNES

LOCATED IN A STEEL BLOCKHOUSE OF 6 000 TONNES TO SHIELD IT AGAINST BACKGROUND RADIATION

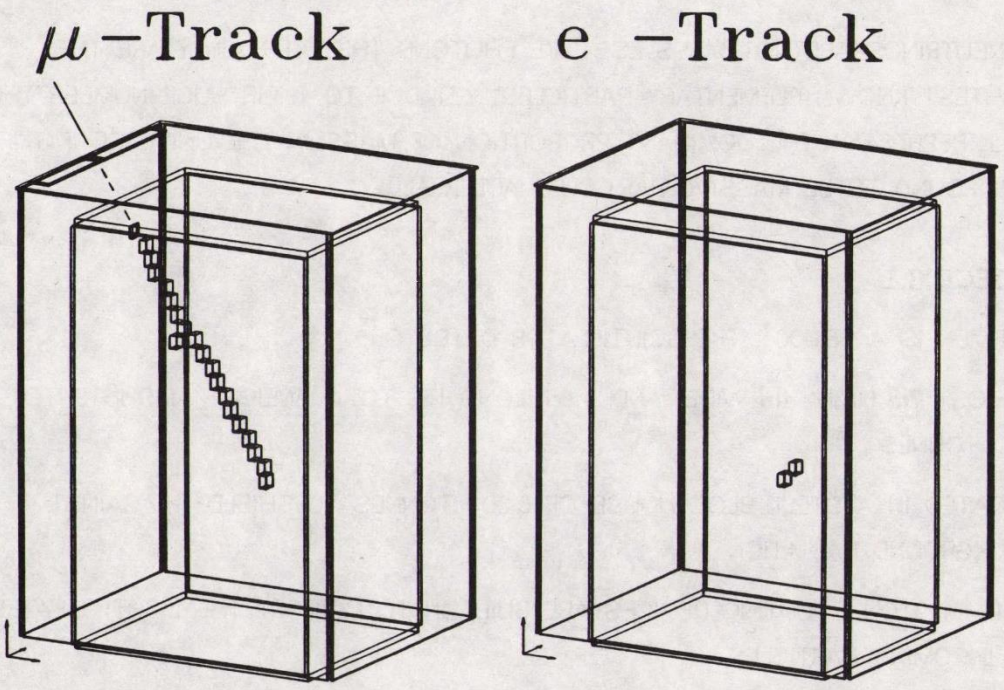
2240 PHOTON COUNTING DEVICES ARE BUILT IN TO COLLECT THE LIGHT CREATED BY INCOMING PARTICLES

ONLY ONE NEUTRINO OUT OF **160 000 000 000 000 000** PASSING THROUGH THE DETECTOR EVERY DAY WILL LEAVE A FOOTPRINT.

THE KARMEN DETECTOR IS DESIGNED TO IDENTIFY A SINGLE NEUTRINO EVENT AMONGST 100 MILLION BACKGROUND EVENTS.



The KARMEN detector located in the shielding blockhouse a few days before it was commisioned for long term data taking in November 1989.



Particle decay of a cosmic muon (μ) as recorded in the KARMEN detector.

The muon deposits a total energy of 760 MeV along its track in the detector before it comes to rest. Some 0.000 014 seconds later exactly at the end of the track appears a signal indicating the decay of the muon into an electron and a neutrino.