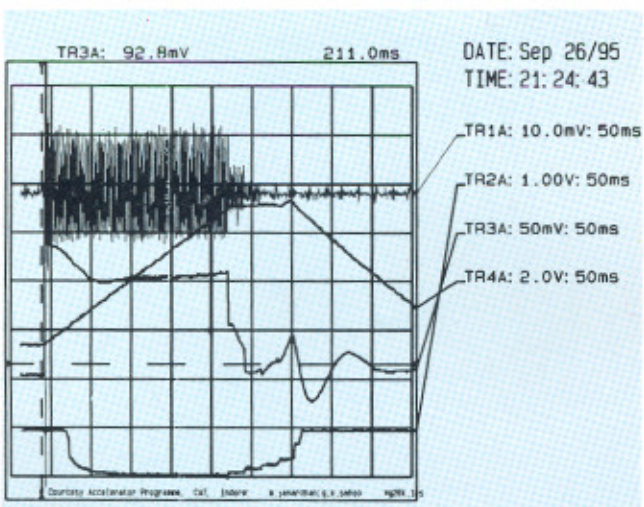
Atlas of Methanol Transitions

A book on atlas of all known microwave, infrared and laser transitions of methanol, co-authored by Dr I Mukhopadhyay, CAT has been published by the CRC press, USA. This atlas contains about 35,000 precise line positions with their quantum number assignments and empirical intensities. The accuracy of the microwave, millimeter wave and frequency measured FIR line positions is better than ±0.1 MHz and the corresponding accuracy for the Fourier transform peaks is of the order of ±6 MHz. These peak lists have been recommended as one of the primary and secondary wave number standards for the FIR region by the International Union of Pure and Applied Chemistry (IUPAC) and should prove valuable for identifying methanol transitions from interstellar clouds. The atlas also provides the most comprehensive catalogue of known optically pumped FIR laser lines from methanol, which is the richest source of FIR laser lines.

ACCELERATOR PROGRAMME

Commissioning of Booster Synchrotron for Indus-1

A booster synchrotron has been developed at CAT for increasing the electron beam energy from 20 MeV to 450 MeV for injection in Indus-1. The energy is imparted to electrons by an RF cavity. As the energy is gained by electrons, to keep them in a stationary orbit the magnetic fields of dipole, quadrupole etc. are increased synchronously. Once the peak energy is reached the corresponding magnetic field is maintained at this value for about 100 msec during which the beam is extracted. After this the fields are again brought to the initial value to receive the beam from microtron. The entire process is completed in one second.



Synchrotron signals during acceleration. TR1A - Fast current transformer signal (13 mV = 1 mA), TR2A - PMT signal, TR3A - DCCT signal (1 V = 10 mA), TR4A - dipole ramp cycle.

Initially, the synchrotron was operated at the injection energy of 20 MeV. This was to facilitate the study of various beam parameters before acceleration. Once satisfactory results were obtained the beam acceleration trials were started. On September 26, 1995 the electrons were accelerated to 480 MeV and synchrotron light was observed. Initial observations were made using photo multiplier tube (PMT) mounted on synchrotron light monitor window and the current was measured by a DC current transformer. Finally, the PMT was replaced with a CCD camera. Synchrotron signals are shown in the figure. The distortion in the signal is due to the low frequency pickups from the ramp cycle. Efforts are in progress to increase the beam current of 1.8 mA further, to inject it into Indus-1.

Commissioning of microtron at Mangalore University

A 8/12 MeV microtron was designed and fabricated at CAT. It was installed and commissioned at Mangalore University on Sept 28, 1995. An electron beam of 8 MeV energy and 20 mA pulse current was achieved during commissioning. Dr R Chidambaram, Chairman, AEC handed over the microtron to Prof M I Savadati, Vice Chancellor, Mangalore University on Sept 29, 1995. On this occasion, an International conference on R&D using electron accelerators was organised by Mangalore University. This microtron will be used as a multi-institutional facility for interdisciplinary research and education purpose.

Dr R Chidambaram, Chairman and Secretary, Department of Atomic Energy , Shri S S Ramamurthi, Project Manager (Accel.) with the Microtron commissioning team from CAT at Mangalore University.

Cover: *The internal details of microtron. The RF cavity, beam extraction channel, field measuring probe and bottom pole of the magnet are visible in the photograph.*

For the first commissioning trials the Atomic Energy Regulatory Board (AERB) gave clearance for operation of microtron only up to an energy of 8 MeV and 20 mA current, from radiation safety considerations. After getting the clearance from AERB the microtron will be commissioned to its designed parameters.

Specifications of Microtron

Electron beam energy	8/12 MeV
Energy spread	0.35% max
Pulse current	50 / 30 mA
Pulse duration	2.5 μsec max
Pulse repetition rate	upto 250 Hz

Kinematic Mount System

Different ultra high vacuum chambers of synchrotron radiation beam line need good optical alignment. To align the mechanical axes of these chambers to the optical axis of the beam line, a system with independent translation and rotational movement of chamber is required. For this purpose, a kinematic mount system has been developed. It consists of three precision studs, assembled with plane spherical angular contact thrust bushing. These three precision studs are arranged in a triangle, in such a way that one of the studs is placed on the mechanical axis of the beam line and held in a movable cross slide. The system has been designed to take a load of 50 kg.

Kinematic Mount System for Synchrotron Radiation beam line.

The above kinematic mount system has been fabricated and one of the ultra high vacuum chambers of the beam line viz. laser alignment box has been aligned using it.

INFRASTRUCTURAL DEVELOPMENT

Computer facility

Access to the global computer network 'Internet' is now available at CAT. A high speed (128 KBPS) link using VSAT has been setup between CAT and STP, Bangalore. A router provides gateway services between CAT computer network CATNET and the Internet. The Internet access at CAT provides services like electronic mail, file transfer (ftp), remote login to other computers (telnet) and host of information browsing services like Archie, Gopher, World Wide Web etc. Information on the books and journals in CAT library has also been made available on Internet. A transit node of ERNET has been setup at CAT providing the Internet and E-mail services to central India. One POWER PC based on PC-601 processor has been connected to CATNET. All Internet browsing tools like Netscape, video and audio players etc. have been installed on this machine.

One high speed graphics work station DEC Alpha AXP 3000 has been installed at Computer Centre. This is the fastest computer system (LINPACK rating 80 MFLOP) available at CAT for scientific computing. The Configuration of computer system is Alpha 21604 at 175 MHz, 64 MB RAM, 2 GB HDD, 32 Bit plane graphics, 21" Colour monitor, OSF-1 and F77. Various information management systems in CAT have been moved to a new and more standard platform i.e. INGRESS RDMBS on Intel based UNIX servers. Library has also been shifted to LIBSYS on a new UNIX server.