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CERN

First beams in the ISR



Kjell Johnsen (left) and Klaus Unser gathering beam data.



Wolfgang Schnell (left) tells it like it is to Mervyn Hine and Hildred Blewett (and Stuart Turner).



Bas de Raad announcing the news at 8.34 (20.34) according to his watch, two minutes after the first circulating beam.

Commissioning storage rings is not so clear-cut as commissioning an accelerator, where the day when particles are accelerated to near design energy is fanfare day. For storage rings it is probably the day when sufficient particles are stored in each beam with a long lifetime and collided to give a healthy interaction rate.

At the CERN Intersecting Storage Rings ISR, component installation in one of the rings is incomplete. But we must sound at least a few trumpets to celebrate the remarkable achievements when first injection tests were carried out with the completed ring.

The annual end-of-year shutdown of the 28 GeV proton synchrotron PS was scheduled so that it would be back on the air ready to send beams to the ISR early in 1971. However, when one ISR ring was completed in advance of the shutdown it was decided to have a few preliminary injection runs.

On the night of 29 October, a few PS bunches were assigned to the ISR while the rest were being used for physics. The ISR control room was thronged with people, including Kjell Johnsen, ISR Director, and practically all the design and construction team. Many others were there also: Bernard Gregory (Director General), John Adams (300 GeV project Director), Kees Zilverschoon (now PS Director, who played an important role in the ISR) and Hildred Blewett (without whom it would be presumptuous to attempt to commission a new machine).

Injection tests usually take days or weeks: getting the beam to go in properly, patiently coaxing it around the ring, progressively

correcting and optimizing the magnet fields. At the ISR, it was decided to set up the ring fields and see if the beam would get round.

Comes the moment, buttons are pressed, protons ejected from the PS are guided to the ISR, injected into the ring and the very first pulse sails right round and carries on sailing round. Probably never before has this happened with a ring anything like this size (about 1 km in circumference, second only to the 76 GeV proton synchrotron at Serpukhov) and complexity (the need to store circulating beams for hours make the ISR rings the most complex ever built). The myriad components, for ejection from the PS, transfer to the ISR, injection into the ISR, magnets, power supplies, vacuum system, beam monitoring system... were all working from the word go. The design team had proved themselves complete masters of their craft.

Within an hour beam storage tests had been carried out and protons had circulated

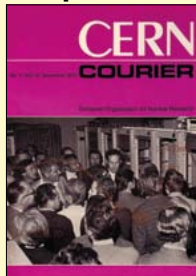
for over twenty minutes. Then came the first stacking test, when successive pulses from the PS were to be added together in the ISR ring to build up a large stored current. Buttons were again pressed and protons stacked at the first attempt, the current climbing steadily to nearly 60 mA.

Did nothing go wrong that night? Yes. The control room clock wasn't reliable and it took an hour to find the key to a locked room, healthy reminders that human beings were involved.

It now remains to bring in the other ring and climb towards a good beam life, design beam intensities and design interaction rates. In the spring of next year it is hoped to achieve collisions. Experimenters will start installing detectors in the intersection regions and, in the middle of the year, the first experiments with high energy colliding proton beams are scheduled to begin.

● Compiled from texts on pp343–345.

Compiler's Note



The ISR ran from 1971 until 1984. Its construction broke new ground in accelerator physics and also extended the CERN site beyond Switzerland into France. It produced the first-ever proton–proton collisions and, though the physics output may not have been earth shaking, converted many sceptics who had questioned the utility of a hadron collider. Notably, stochastic cooling was developed at the ISR, making it possible to build the SPS proton–antiproton collider, where the W and Z bosons were discovered 30 years ago.

The ISR tunnel is now used for storage and magnet work and its magnets form part of the LHC beam dump.