laser. It would be useful for studying gas impurities in the atmosphere, for example. The cw dye laser's tunable output could also be used to obtain mode-locked pulses for spectroscopy in the picosecond time range; although this has already been done with pulsed dye lasers the sensitivity would be higher with the regular pulse train available from the cw laser. In chemistry and biology one could apply a wide range of wavelengths to initiate photochemical reactions selectively. For communications the laser could be used in the optical equivalent of frequency modulation. —GBL

Brookhaven AGS modification has 200-MeV linac

The highest-energy proton linac in the world reached full energy, 200 MeV, on 18 November at Brookhaven. The new linac is part of the $50-million AGS conversion project, which is now well advanced, according to George W. Wheeler, head of the project. Most of the conversion will be finished in July.

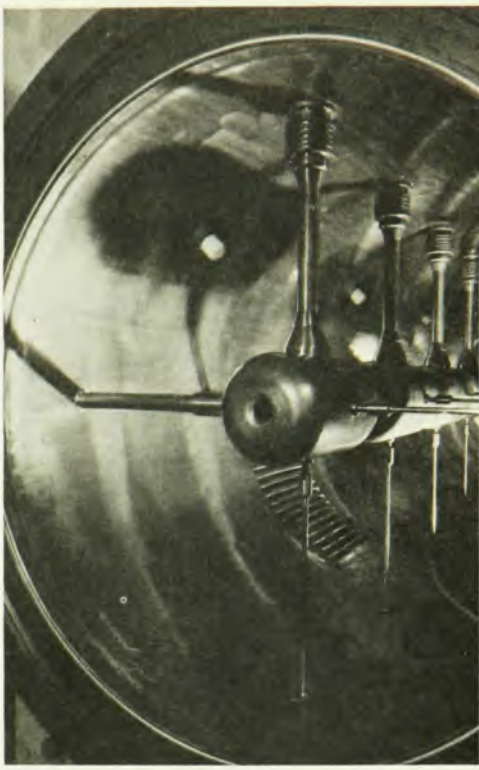
Another 200-MeV linac of similar design is being built at the National Accelerator Laboratory; it produced a beam of 139-MeV protons in October. Prior to that the highest-energy proton linac was the 100-MeV injector for the Serpukhov 70-GeV accelerator.

At present the 30-GeV AGS operates at about 2.5×10^{12} protons/pulse, cycling about once every 2.4 sec with a 0.2-sec flat top. Conversion is expected to produce an intensity greater than 10^{13} protons/pulse with a cycling rate of once per second without flat top or once per two seconds with a 1-sec flat top.

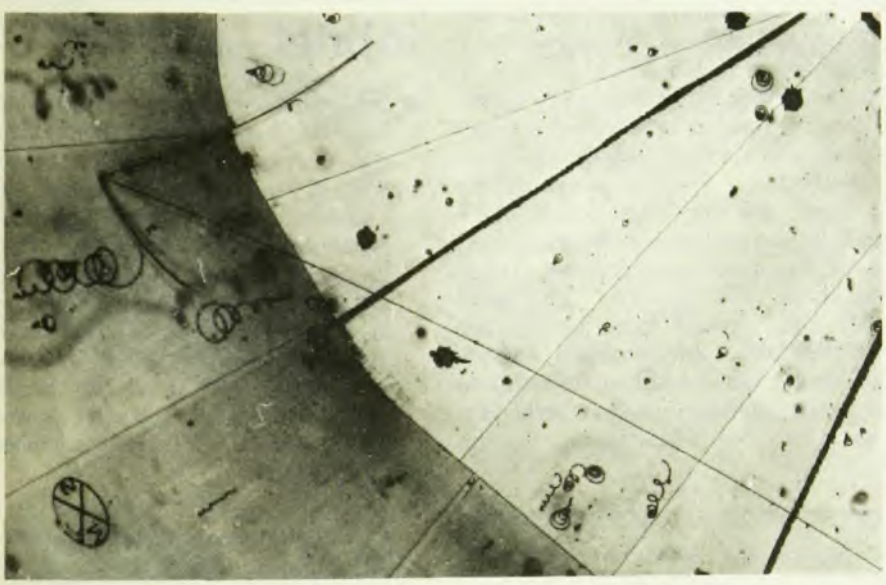
The new linac will replace the existing 50-MeV linac as injector.

A 750-kV Cockcroft–Walton generator with duoplasmatron source and high-gradient accelerating column acts as preinjector for the linac and has yielded 400 milliamps of pulsed current.

The 475-foot linac consists of nine independent resonant cavities. The first cavity, 24-feet long, has yielded 200-milliamp beams. The remaining eight cavities are each about 52 feet long and use a multistem drift-tube system; the stems form local resonant circuits that interact with the rest of the cavity to smooth out bumps in the electric field.



Resonant cavity of Brookhaven 200-MeV linac showing multistem arrangement. The 475-foot linac is the new injector for the 30-GeV synchrotron, which is now being improved.



First neutrino event in a hydrogen bubble chamber was found on Friday the 13th of November on film taken with the Argonne 12-foot chamber. A neutrino coming from the left interacted with a proton to produce the three-pronged event consisting of a μ^- (longest track), a proton (shortest track) and a π^+. Neutrino–proton interactions had previously been observed in a propane chamber at CERN, but not in a hydrogen chamber.

Both Argonne and Brookhaven, which has a 7-foot chamber, are preparing to start long runs to measure neutrino–nucleon interactions. Neither device is completely shaken down yet, though. Argonne will have neutrino beams of 0.5–1.5 GeV/c, and Brookhaven will have one that peaks at 2–3 GeV/c.

The Argonne chamber will continue to run with hydrogen during an initial exposure of about 500 000 pictures. Based on the success of this running, the chamber will then be scheduled for a deuterium filling and an additional one million pictures. This later run will study the axial vector form factor in the weak interaction, as will the Brookhaven run, which will start with 300 000 pictures in deuterium; 700 000 pictures more are proposed for a later run.

During the November tests at Brookhaven the linac produced a peak current of 20 milliamp at 200 MeV, a value kept deliberately low to avoid unnecessary activation of components during the tune up. Eventually a current of over 100 milliamps is expected.

Linac pulses not needed for injection into the AGS will be diverted into a spur tunnel where destructive beam diagnostics and radiochemistry studies will be carried out. Most of the beam, though, will be absorbed in targets specially designed to produce radioisotopes by spallation.

At the AGS itself the acceleration rate is being doubled (to 30 GeV in 0.5 sec) with a new main-magnet power supply, which consists of a Siemens motor-generator set (12 000 horsepower and 96 MW peak, respectively) and two rectifier banks, each containing 48 mercury-arc rectifiers. The entire system is expected to operate this month.

With the shortened acceleration cycle much higher rf voltage gain around the main ring is needed. A new rf power-amplifier system has been operating for over a year. New accelerating cavities will be installed later. An entirely new vacuum chamber and pumping system has been built and is one-third installed. Many other main-ring modifications are being made, primarily to reduce radiation damage and increase serviceability.

Tunnel shielding has been increased