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Supplement

Synchrotron Dedication Today

Supplement Editor: Sam Pizzigati 70

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UNDER UPPER ALUMNI: Artist's cutaway sketch shows the Robert R. Wilson Synchrotron. The half mile long circular tunnel contains the magnet ring, a major component of the synchrotron. The straight tunnel is used for easy access to portions of the circular tunnel and leads to an exit on the main campus The ring is 43 feet below ground level

Synchrotron Most Costly Project For National Science Foundation

By MARK D. GOLDMAN

Leland J. Hayworth, director f the National Science of the National Science Foundation, will help dedicate today Cornell's new, \$11.298,000 synchrotron. In doing so, he will be putting the symbolic finishing touches on the largest single project ever funded by NSF and the most imposing of the multitude of government financed research ventures which extend throughout the University's operations.

which extend through University's operations. The NSF is a federally created organization which, according to its brochure, was created to "initiate and support programs designed to strengthen scientific

The Wilson Synchrotron was funded not a minute too late according to Prof. Boyce McDaniel, synchrotron director. If the University tried to get needed funds now for the synchrotron, "it would be hopeless" in McDaniel's words because of financial situation in the Washington

research and education in the sciences

In the fiscal year ending June 1967 Cornell received nearly \$30 million in outside money, most of it from the federal does not include construction government, for sponsored research projects. This figure does not include construction costs or training costs, but merely indicates the amount of memory speeded on the research money expended on the research itself

itself. In the case of the new synchrotron, though the structure cost over \$11 million to build. NSF has pledged, according to Thomas R. Rogers, Director of the Office of Sponsored Research, to contribute "about \$2 million a year" to underwrite the cost of

operating the electron accelerator. Rodney Dennis, associate director of Rogers' office, added that the only condition which the

government imposed upon the University in return for the money granted is that "Cornell must carry on the training of graduate students in the area of particle physics for the next 20

years." NSF is the single largest contributor to the University's sponsored research programs. In addition to the construction and operation of the synchrotron, this government agency is vitally involved in the \$4 million renovation of Baker Laboratory, played a part in the development of the Materials Science Center, most of which is located in Clark Hall, and is making some contribution to the construction the new Social Sciences building.

Another big contributor to Cornell research is the Department of Defense. It is responsible for the financing of the construction and operation of the radio telescope in Arecibo,

the radio telescope in Arecibo, Puerto Rico. When asked if Cornell in any way favored the development of research projects in specific areas Rogers replied. "There is no such thing as a University priority... As far as federal funds are concerned anyone (on the faculty) is free to apply. We try to get them what they want." He did concede, however, that "most of the money is going into the 'hard sciences."

"most of the money is going into the 'hard sciences." A breakdown of the total research expenditures reveals that the humanities receive less than one percent of the total funds allotted. The social sciences get slightly more than eight nergent. Environment, the eight percent. Engineering, the physical sciences, and medicine together account for over 60 percent of the funds expended. But Rogers asserted that this

imbalance was the result "of priorities established by outside agencies.

He noted that all the money was going into activities related was going into activities related to graduate school activities. "But," he added, "all the research conducted here is academically related. Even if it is connected directly to the grad schools alone, we feel that a good graduate school program will enhance undergraduate education.

Cornell Machine World's Largest

PAGE 7

By MATTHEW FEINSTEIN

and SAM PIZZIGATI The Robert Rathbun Wilson electron synchrotron, the largest and most powerful in the world, will be formally dedicated here today.

dedicated here today. The \$12 million machine has been operating at full energy, 10 billion electron volts (Gevs), since March 5. The dedication will take place at 4:45 p.m. and will be followed by a reception and dinner. During the day informal seminars will be held for the

exchange of information among the many scientists who have

subject of the ceremony for the construction of the construction of the carbon of the

Joining him will be Prof. Boyce D. McDaniel, present director of the Laboratory of Nuclear Studies and head of the synchrotron's experimental program and Leland J. Hayworth, director of the National Science Foundation.

Dr. Maury Tigner, senior research associate in nuclear research associate in nuclear studies, and experiment schedule maker for the synchrotron, Prof. Donald Edwards, physics, Prof. Raphael Littauer, physics, as well as other professors in the Cornell community who have helped during the synchrotron's development, will also be present.

Among the many other guests will be President James Perkins and members of the Board of Trustees and University the Cornell Council.

Of nearly the dozen other synchrotrons of at least one Gev in the world today, only four approach the strength of the Cornell machine. The United Cornell machine. The United States, at Cambridge, Mass.,



DR MAURY TIGNER Schedule Maker

England, Germany and the Soviet Union each have one of these large synchrotrons, but none exceeds seven Gevs.

a 'sledgehammer' Synchrotron Physic's Future



THE BEGINNING: Jerome H. Fregeau, the National Science Foundation's representative, Prof. Boyce D. McDaniel, director of Cornell's Laboratory of Nuclear Studies, and Prof. Robert R. Wilson former director of the lab for whom the synchrotron was named view the synchrotron model when the contract was rewarded three years ago.

The synchrotron is sledgehammer of mo the modern

physics. It produces an intense beam of electrons which is used to shatter any atom or subatomic

shatter any atom or subatomic particle that happens to be in the immediate vicinity. Probably the main preoccupation of physicists over the past few decades has been to try to figure out some kind of order in the atomic wreakage that one of these machines produces

Naturally, the more energy one has, the more wreakage it produces, which makes life all the more interesting for physicists in general.

Put another way, the more energy a synchrotron has, the greater is its resolving power. That is, it can 'see' interactions at shorter and shorter distances and times.

The Cornell synchrotron, for instance, has been used to check Coulomb's Law, one of the basic laws of physics, at a distance





¹⁰ Synchrotron Can Send Electron **1500 Miles in Fraction of Second**

Continued from Page 7 about half as great as had been possible before.

A synchrotron works by taking ordinary run-of-the-mill electrons and bringing them up to very high energies. Each time electrons go around

b Lach time electrons go around the synchrotron loop they are given four pushes by strategically placed electron pushers, more commonly known as radio frequency resonating cavities

Each of these things can only add a relatively small (up to 2.5 million electron volts) amount of energy the the electrons, so the electrons have to go around the loop many times in order to

loop many times in order to come up to their final energy. In fact, the electrons go around the loop about 3000 times, travelling a total distance of 1500 travelling a total distance or fishor from here to New Orleans, in a time of about .007 seconds.

They actually end up a few yards from where they began and are either used themselves for experimentation or are used to make x-rays or other things which are in turn used in other experiments

Electronic Circles One of the problems one runs into in designing a synchrotron is that electrons, by themselves, do not tend to travel in circles, and in fact would tend to shoot off

into space somewhere So, electron-path-benders, also known as electromagnets, are

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placed around the loop. Finally, if you take a bunch of electrons and put them at the start of the synchrotron loop, they will just sit there and not do anything. They must be given some energy beforehand and be shot into the loop. This is done at the Cornell machine with what is called a

linear accelerator, which brings the electrons up to 150 million electron volts. that

Another problem generally encount another problem that is generally encountered is figuring out just what it is that the electrons have done, after

the electrons have done, after they've done what they do. One device that is used at Cornell is what is called a spark chamber. When a particle goes through the chamber, its path is traced out in sparks and its picture is taken from various seaters. angles

Scintillation

If the experiment is not as much concerned with exactly where the particles are as how many there are, a scintillation counter is used.

With a scintillation counter, as

the name implies, as something happens it scintillates, or gives off light, and these pulses of light are then counted.

An unfortunate tendancy electrons travelling around in circles is that they tend to give off radiation thereby loosing energy. Besides the energy loss, this

radiation tends also to be harmful to any biological material that happens to be around

Safety Measures

In order to avoid damaging the experimenters and their future families. elaborate safety precaustions are taken.

precaustions are taken. For one thing, no one is allowed near the machine while it is in operation. If anything in the tunnel moves while the machine is going it is detected with an electric eye network which is said to be difficult to circumvent.

If anything is detected, synchrotron personnel ride around the tunnel on a bicycle to find out just what is going on. -MATTHEW FEINSTEIN



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October

Thursday

Illness Ends Bangs' Reign Donovan Runs 8 NYC Schools, 12 As County Dem Chairman

John F. Bangs resigned as the Tompkins County Democratic Committee Chairman, this Monday. Banks is presently in the hospital suffering from a heart attack, which occurred

10,

Chursday, October

Sun

Cornell Daily

The

heart attack, which occurred Monday, Sept. 30. Accroding to Mrs. Bangs, her husband resigned from his chairmanship because he felt

Detroit Mauls St. Louis, 13-1

Continued from Page 1

Tigers hopped on him for two runs in the second when Norm Cash walked on a 3-1 pitch, Willie Cash walked on a 3-1 pitch, willie Horton doubled him home and Bill Freehan broke a 16-at-bat hitless streak, with a single scoring Horton.

The third inning started innocently enough with a walk to Dick McAuliffe on four pitches. Before it was over 10 runs were

Before it was over 10 runs were in, 15 men had been at bat and the Cards' Washburn, Jaster, Ron Willis and Dick Hughes had been roughed up for a grand slam homer, six singles, four walks and a hit batsman.

Walks and a hit batsman. Kaline, the hitting star of the Tigers' fine comeback, delivered his second Series homer with nobody on in the fifth against Steve Carlton, fifth of seven Coacheiterer Card pitchers.

McLain never had it so good. The 31-game winner of regular season coasted along with a big lead, pitching steady ball against the deflated Cards.

that there was "too much tension and dissension in the party this year," and that the resulting stress was "more than

he can stand." Mrs. Bangs said that the doctor advised her husband to resign as chairman because a heart condition is worsened by stress. Mr.

stress. Mr. Francis Fabbricattore plans to run for the office which is elected by the county democratic committee. There are no other candidates for the chairmanship at this time. According to Mrs. Bangs, her Fabbricattore "a fine man." In his resignatin, Mr. Bangs said of Mr. Fabbricatore that "If any Democrat in Tompkins County has earned the title of Mr. Democrat Fab most certainly has."

certainly has." Mr. Bangs is also at present

Mr. Bangs is also at present the third ward alderman and acting mayor. He will continue to hold these offices.

Curly's Chicken House

367 Elmira Rd., Ithaca Phone 273-9466 We Cater To Private Parties, Banquets and

Suspends McCov

Continued from Page 1 McCoy was suspended with the McCoy was suspended with the seven principals yesterday for defying Board of Education orders to reinstate 80 white members of the AFL-CIO United Federation of Teachers. The 80 were ousted from their Ocean Hill clearcomes in a dispute that Hill classrooms in a dispute that grew out of the decentralization of the district. Four of the seven principals are Negroes, one is white, one is Puerto Rican and one is of Chinese extraction.

Over the weekend, the 19-member local governing board of Ocean Hill also had been suspended. Their attorney filed a suit during the day in State Supreme Court asking for their reinstatement. A hearing was set for Friday.

The predominantly white UFT, with 55,000 members, had threatened a citywide teachers strike for the third time in a month, unless the Ocean Hill teachers were restored to their original duties

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Scouting Penn Zbrzeznj, Santini Spark Quakers

By RED MARKS

The University of Pennsylvania football team is 2-0 this season. The Quakers stomped on Bucknell in the opener, 27-10, then went on to romp over Brown last week by a formidable 17-13 margin.

formidable 17-13 margin. Regarding the relative merits of Penn's two foes thus far, Buckness succumbed to Harvard last Saturday in a 59-0 rout, and Brown is the same team we've all known and loved for years. Merely because Penn already has two victories under its belt.

has two victories under its bert, then, is no sure-fire indication of how good or bad coach Bob Odell's Quakers really are. Their performance against Cornell Saturday will be the true test.

There are definite indications, however, that this year's Penn squad may well be considerably stronger than Quaker teams of recent seasons. Cornell assistant coach Bob

Valesente, who has done the scouting on Penn over the last two weeks, was impressed by a "unity and desire" that may

previously have been absent. The spirit of the Quakers was obvious enough for Valesente to notice that they "responded to pressure by pulling together and were able to take advantage of opportunities given to them." opportunities given to them," especially in the Bucknell game. More important than picking up on Brown's mistakes in the

second game was the ability of the Penn offense to move the ball both on the ground and through the air. As far as mistakes go, Penn had enough of its own in the scoreless second half.

The Quakers lost two fumbles and had a pass intercepted, which kept them from making the win over Brown look easy. In the first half, however, the Penn offense amply showed the same effectiveness it had

displayed the week before

against Bucknell. Led by quarterback Bernie Zbrzeznj, halfback work-horse Gerry Santini, and end Pete Blumenthal, the Quakers have racked up a creditable 618 yards

racked up a creditable 618 yards in their first two contests. The 5-9, 172-pound Zbrzenj (Za-brez-nee for you baffled linguists bas, in his roll out style, completed 18 of 33 passes for a total of 240 yards. But the diminuitive QB can run as well, as evidenced by his eight-yard scamper for a touchdown against Brown. Brown.

When the ball is to be run, When the ball is to be run, however, it's a good bet that Santini will be holding it. The senior from Syracuse had 33 and 36 rushes respectively in the two games and is presently averaging 4.2 yards a carry. He has scored three six-pointers. Zhrzamit, primeru, pacing

Zbrzeznj's primary passing target is Blumenthal, who has caught the ball 10 times for a total of 164 yards and one touchdown.



Take a potent attack which just didn't explode. Then add a pair of officials who's calls were questionable and at times most inconsistent. The result, frustration. That was about it yesterday afternoon as Colgate left Upper Alumni field with a stunning 1-0 upset over the Big Red soccer team.

While the win was the result of a tremendous effort by the out classed Maroon Raiders things just didn't go right for Cornell. From the start it was apparent that Celete or the start is the start of the start is the start is the start of t that Colgate was up for the game. The boys from Hamilton grabbed every break they could get and a few more as they took their 1-0 lead with 1:05 gone in the second period on a ball headed by Bob Tisch.

Cornell's scoring woes centered around mid-field where Colgate maintained ball control It was not until the closing minutes of the first half that Cornell really got going. The Raider's managed to weather these scoring thrusts however as three shots off the foot of forward Nick Alexandridis were partically blocked. Cornell coach Bill Pentland's

half time show really fired up the Red as they came out flaming. After only two minutes of action Cornell appeared certain to even the score as Alexandridis stood ready to drive a penalty kick past Rich Umpleby. Umpleby was golden as Alexandridis failed to connect for the first time in his varsity

career. Several beautiful crosses by wing Clark Mycoff were eaten up wing clark Mycon were eaten up by Umpleby. Allen Dittenhoefer got hold of a corner kick high in front of the Colgate net and let loose with a spectacular scissoring volley kick. The Radiers lucked out however as the point blank bomb was right at Umpleby.

While he ended up on the wrong side of the shutout John Penniman played a strong game making 13 well timed saves including one on a Mario Pennusi penalty kick attempt

Defensively, Penn may be hurting because of the abundance of starting underclassmen that make the squad "prone to mistakes" in Valesente's opinion. The strong defensive link is George Burrell, who heads an innovative fourman deep secondary, as opposed to last year's three-man lineup.

SPORTS NOTICES

CROSS COUNTRY

The deadline on entries for the Intramuarl Cross Country Meet is today at 2 p.m. All those who wish to compete should register at the Intramural Office.

FENCING MANAGER

Any freshman or sophomore interested in becoming assistant fencing manager should contact Ed McCabe in the Teagle Hall fencing room, any weekday at 5 p.m.

FRESHMAN SKI TEAM

All freshmen interested in trying out for the freshman ski team should report to Barton Hall-tomorrow at 4:30 p.m.



DRANK

CROSSWORD PUZZLE





October

sday.

Sun

Cornell Daily

The