LETTERS

Base SI Units

I read with interest the article "Using time to measure length" by Arthur L. Robinson (Research News, 24 June, p. 1367). I would like to point out that the seven base units of the International System of Units specify standards for time, distance, mass, temperature, current, amount of substance, and luminous intensity; the last two quantities were replaced by voltage and resistance in the article.

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Floating Accelerator

Reading "Neutrino exploration of the earth" by M. Mitchell Waldrop (Research News, 10 June, p. 1142) brought to mind the original tongue-in-cheek suggestion of a floating accelerator by William A. Shurcliff in *Science* (Letters, 5 November 1965, p. 685). Shurcliff's letter predates by 7 years the suggestion by Alvaro De Rújula, Georges Charpak, Sheldon Glashow, and Robert Wilson of a floating accelerator mentioned by Waldrop. Shurcliff's letter is uproariously funny and, in my opinion, deserves republication in view of its prophetic nature.

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We reprint below the prophetic letter.—Eds.

Floating Accelerator: Progress at Last

It has been a pleasure to observe, during the last 6 weeks, increasing interest among policy makers in the proposal that the 200-Gev proton accelerator be located on a large, specially designed, floating platform. Long recognized as offering unique advantages of flexibility of use and economy of construction, the plan has been plagued by questions of safety. Happily, these have been solved, and, according to a report soon to be issued by the Conference of Eastern Coastal Universities (CECU), full-scale consideration of the plan is now warranted.

The report stresses two main design goals: (i) avoidance of extensive use on land and (ii) transferability of the accelerator from one harbor to another at approximately 6-month intervals. Preliminary engineering surveys show that the harbors of New York, Philadelphia, Baltimore, Boston, and Norfolk, Virginia, are almost ideal for the purpose, and West Coast harbors could be used after the widening of the Panama Canal is completed.

The accelerator, of strong focusing (alternating gradient) type, would be incorporated in four floating platforms, each about the length and width of a modern 100,000-ton oil tanker. Each would have the form of a quadrant of a circle, and the four units would be joined (by a precision key system and giant hydraulic clamps) to form a single rigid ring. Prior to the clamping operation, ballast tanks in each quadrant would be flooded with sea water to appropriate depth to bring the quadrants to the same level. Thanks to the slight elasticity in the integrated structure, fine-scale alignment of the quadrants of the synchrotron itself can be accomplished by fine adjustment of the water levels in these tanks.

The diameter of the accelerator is relatively small: 400 meters. Correspondingly more powerful magnetic guide fields are provided by 60-kilogauss superconducting magnets of low-inductance design in a multiple-pyramiding arrangement which provides especially tight control of betatron oscillations without significant increase in the period of the synchrotron oscillation (except at injection, when special pentapole magnets of diamagnetic ferrite are superimposed on interphased counterfields).

Plans for the linac injector are still tentative, but may call for a 1500-foot 1-Gev traveling-wave assembly mounted on two aligned concrete barges to be held by slender, prestressed-concrete equants in rigid tangential orientation.

The ring of 1024 magnets, located in a common circular tunnel running through all four platforms, will be situated 6 meters below the waterline, so that adequate shielding is provided, at no expense, by the surrounding water. A protective screen of nylon netting will probably be mounted some 10 or 20 meters from the quadrants to keep fish away and thus prevent radiation damage to them. The use of such a screen was suggested by the Izaak Walton League.

Although shielding, cooling, and electrical grounding present no problems (thanks to the unlimited amount of sea water available), the provision of adequate power poses problems. Because city electric power, supplied to the accelerator via submarine cables, may be in short supply during the daytime, the accelerator may have to be operated at night only. (If so, tourists could visit the accelerator during the day, and the entrance fees charged might pay a significant fraction of the operating cost.)

When repair work must be performed in the circular tunnel, which would soon become highly radioactive, accelerator engineers would fill the entire tunnel with sea water. Mechanics employing aqualungs or diving suits could then work in complete safety.

A separately constructed central area of the assembly would contain machine shops, special power supplies, a large control room, administrative headquarters, and also a kind of motel (with parking for helicopters rather than cars) for the crew of approximately 1000 engineers and technicians. Recreation facilities would include a movie theater, squash courts, swimming pools, and a specially stocked fishing pool.

The plan circumvents rivalry from groups in different parts of the country. (The possibil-