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**COVER:** Quasars and maybe other kinds of astronomical radio sources appear to be shooting galleries for electrons and protons. In this schematic, due to Richard Lovelace of Cornell University, the shooting is done by a black hole that gathers ammunition from an accretion disk around it and aims along the lines of its magnetic field. See p. 282

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 New York, N.Y. 10036  
 Fred W. Dieffenbach,  
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**Editorial and Business Offices**  
 1719 N Street, N.W.  
 Washington, D.C. 20036

**Subscription Department**  
 231 West Center Street  
 Marion, Ohio 43302

Subscription rate: 1 yr., \$15.50, 2 yrs., \$27.00, 3 yrs., \$37.50. (Add \$3 a year for Canada and Mexico, \$4 for all other countries.) Change of address: Four to six weeks' notice is required. Please state exactly how magazine is to be addressed. Include zip code.

Printed in U.S.A. Second class postage paid at Washington, D.C. Title registered as trademark U.S. and Canadian Patent Offices.

Published every Saturday by SCIENCE SERVICE, Inc. 1719 N St., N.W., Washington, D.C. 20036. (202-785-2255) TWX 710-822-9433 SCIEN NEWS. ISSN 0036-8423

# LETTERS

**Riggatron: Con**

In the article "Disposable Fusion Reactor," Janet Raloff did a commendable job in presenting the views of Dr. Robert Bussard. It was an interesting portrait of the entrepreneur in action. My only concern is that readers might accept all of his statements as gospel rather than the opinion of one man. Rossman's letter (SN: 9/2/78, p. 165) indicates that at least one reader succumbed to the temptation. ... Your readers should consider:

(1) The concept is, from a physics point of view, based on the work at MIT on the Alcator devices, work initiated by this office more than five years ago. When Bussard requested funding from the Department of Energy in 1977 to perform a feasibility assessment of his concept, we responded by providing \$639,000. This was completed in March and documented. His final report has been reviewed by an independent design-review panel composed of eleven experts in fields important to the design. The panel unanimously concluded that the Riggatron program should not be continued.

(2) Much of the apparent advantage of the Riggatron is due to far more optimistic assumptions about physics or technology than other members of the scientific community can regard as realistic. Examples are: assumption of a 30-day lifetime for the reactor unit when current radiation-damage data indicate four days, assumed plasma pressures an order of magnitude larger than critical pressures which lead to instability in our best magnetohydrodynamic codes, and tritium breeding so marginal in an idealized system as to be unacceptable in any practical device.

(3) Any cost advantage which might accrue due to the claimed small size of the Riggatron is offset by the fact that as Bussard has developed more details of his design, he has been forced to increase its size and power output. Specifically, although Bussard's original proposal was for a device producing 200 MW of thermal power, the results he reported after completing his initial feasibility assessment indicate the thermal-power output per Riggatron has increased to 1,260 MW to 1,750 MW. Since the nominal Riggatron power plant contains five units, the total-plant thermal power would be 6,300 MW to 8,750 MW. This must be contrasted with the most recent "main line" tokamak concept designed to produce 2,100 MW thermal.

Furthermore, the thermal power output determines the size of the power conversion system and balance of plant which compose approximately 70 percent of the total power plant cost. Thus, even though his fusion power cores may be small in size, the entire power plant in which they would be used would be larger and more costly than the more conventional designs.

Unlike usual fusion reactor designs which have room for error, the Riggatron must work

perfectly in order to work at all, according to the reviewers. Even the possibility of such perfect operation has yet to be demonstrated within reasonable assumptions by INESCO.

(4) Even if the review had resulted in a recommendation to continue the Riggatron program, the cost and time required to complete it would be substantially more than your readers might realize. Bussard requested \$6,200,000 for the next phase of design studies and model tests. The entire program has been estimated by INESCO to take ten years and \$150,000,000 in direct charges with a similar amount for supporting research. It is my judgement that the program would cost much more.

We continue to be very interested in investigating alternatives to our current mainline program in the interest of developing a better, less expensive or more rapidly deployable means of generating fusion power. We are evaluating the most promising alternate concepts with the intent of identifying one or more additional confinement concepts on which development will be accelerated.

*John F. Clarke*  
 Deputy Director  
 Office of Fusion Energy  
 Washington, D.C.

**A tough test**

"Only patients whom conventional therapies have not helped will be asked to participate" (SN: 10/7/78, p. 247)?

It appears that, to pass the FDA's test, Laetrile will have to do more than surgery, radiotherapy, and orthodox chemotherapy put together!

*Taras Wolansky*  
 Thiells, N.Y.

Address communications to Editor,  
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 Washington, D.C. 20036  
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1. TITLE OF PUBLICATION SCIENCE NEWS	2. PUBLICATION NO. 114	3. DATE OF FILING October 21, 1978	4. ISSUE FREQUENCY WEEKLY
5. LOCATION OF HEADQUARTERS OFFICE OF PUBLICATION (Street, City, County, State and ZIP Code) (Not printer) 1719 N. St., N.W., Washington, D.C. 20036	6. LOCATION OF THE HEADQUARTERS OF GENERAL BUSINESS OFFICES OF THE PUBLISHERS (Not printer) 1719 N. St., N.W., Washington, D.C. 20036	7. NUMBER OF PAGES 8	8. NUMBER OF COPIES OF THIS ISSUE 312,500
9. NAMES AND COMPLETE ADDRESSES OF PUBLISHER, EDITOR, AND MANAGING EDITOR			
PUBLISHER (Name and Address) E. G. Sherburne, Jr., 3110 Hawthorne St., N.W., Washington, D.C. 20036			
EDITOR (Name and Address) Robert J. Trotter, 1731 B St., N.W., Washington, D.C. 20036			
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