letters

Once upon a time, a quark
Was out there walking in the park,
Being glad he was alive,
Hoping that he would survive.

He'd read a lot of scary articles
About subatomic particles
And how they seem to come and go.
The physicists said it was so.

The quarks live with this certain sorrow:
Here today and gone tomorrow!
Existence is so tragicomic
When you are only subatomic.

Anyway, this little quark,
This one day out there in the park,
Was suddenly severely stricken
He felt his little heartbeat quicken

For heading toward him was this queen,
The prettiest quark he's ever seen.
The way she moved, the way she looked,
This poor old quark, his goose was cooked.

He'd had it now; he'd bought the farm,
This little quark had class, had charm.
Yes, that was it—and how alarming
To see a quark so very charming.
A thunderbolt came from above
And out tiny friend, he fell in love.

The evidence is inconclusive,
For charm is something so elusive,
But physicists are very straight
And they say quarks, indeed, do mate.

So this quark goes up and tips his hat,
And bows a bit, then tells her that
He is a quark alive and active
And that he finds her quite attractive.

And then he asks her for a date,
Only to hear the charmed quark state
She can't 'cause she's already hitched;
By an antiquark she's been bewitched.

And by the laws they function under
Quarks cannot be split asunder.

"Hold on there, kid!" our quark friend chimes,
"I just read in *The New York Times*
That if a quark like you is charmed
It cannot be destroyed or harmed."

And he shows this charming little particle
Walter Sullivan's front-page article.

"Well, I'll be darned!" she blushed and said,
As with interest she looked and read.

"Read on, my dear, there's even more."
And sure enough, there on page four,
The story was detailed, enlarged.
Our particle became so charged

That off they went, arm in arm,
Two happy quarks with special charm.

'Tis only theory, I fear,
But what a way to start the year.

Announcements

Newsbreak. Charles Osgood, CBS News.

Theorists would probably *not* agree with all aspects of this poetic interpretation of the quark but then the same complaint can be made about any other quark theory. We are sure that all physicists *will* agree with us in congratulating Osgood and CBS for choosing to start off the new year with this delightful contribution to public awareness.—*Editor*

Credit hour overload?

Please tell me that W. A. Sibley's otherwise reasonable letter to the editor (August 1975, page 11) referred to "1400 student credit hours per year" rather than "14 000." Otherwise, perhaps Sibley could elaborate upon the educational/research functions of his "full-time faculty of 20."

JOHN D. E. FORTNA
District of Columbia University

THE AUTHOR REPLIES: The number 14 000 student credit hours per year is correct. However, John Fortna has an excellent point. In shortening the article to letter length, I omitted the graduate-assistant teaching component and assumed that in most PhD-granting departments a one-half time graduate assistant per faculty member would be available to help meet this teaching load.

W. A. SIBLEY
Oklahoma State University
Stillwater, Oklahoma

Funding cutoff

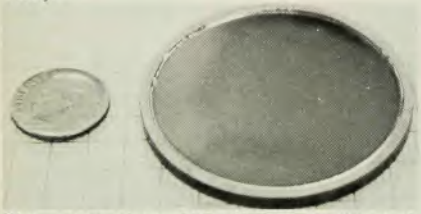
Imagine the shock we felt when we learned on 9 January 1976 that funding for the entire Nuclear Sciences Program at Ames Laboratory and Iowa State University would cease at the end of FY 1976 (30 September 1976). This occurred in spite of recent excellent ratings in reviews of the quality and quantity of the research and in the face of continuing progress in exciting new experimental and theoretical directions. This late date of disclosure seriously hinders the possibility of our acquiring a new source of funding in time to maintain continuity in the TRISTAN research program.

Stimulated by the magnitude of our particular crisis, we feel that the cuts in real funding for nuclear sciences in the Division of Physical Research within ERDA should be brought to the immediate attention of all physicists—but especially those in nuclear sciences. Such cuts bring "the multifaceted program . . . perilously close to extinguishment."[1] One can only speculate that this funding picture stems from the inability of those in control of the funds to consider the nuclear-sciences program on its own merits.

KEVEX Si (Li) DETECTORS

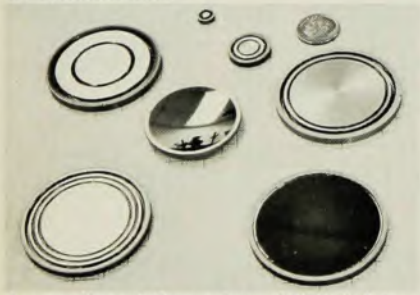
Charged Particle Analysis
● Uncooled Detectors ●

Kevex Si (Li) ultra high resolution detectors range in size from 10 mm² active area to 1,500 mm². A 750 mm² detector is specified at 16 keV FWHM for 624 keV conversion electrons (Cs-137).



Size comparison: U.S. dime vs. 1500 mm² Si (Li) detector.

Two concentric Si (Li) detectors with negligible cross-talk are formed on a single silicon wafer. The outer detector may be operated in anti-coincidence with the central detector. A charged particle telescope consists of several such detectors assembled along a common axis.



A sampling of the variety of Si (Li) detectors available to the physicist.

Grounded guard-ring concentric detectors (three rings) exhibit improved signal to noise ratios.

Size comparison: U.S. dime vs. spherical detector.

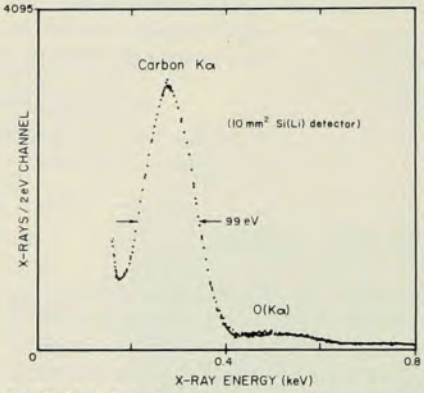
Spherical Si (Li) detectors with axial radii on the order of 50–100 mm offer uniform radial thickness for omni-directional dE/dx measurements.

Detector reliability is vital on a 21 month mission.

Sixteen Kevex Si (Li) detectors performed faultlessly in both PIONEER missions to Jupiter. As a result of this success, Kevex is the only detector manufacturer selected to supply Si (Li) detectors for the forthcoming MJS (Mars, Jupiter, Saturn) experiments.

X-Ray Photon Spectroscopy
● Cooled Detectors ●

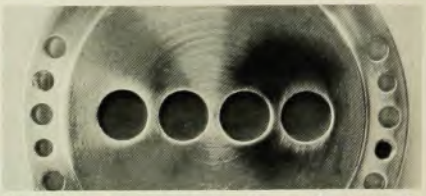
MICRO-X (windowless) Si (Li) detectors analyze K shell x-rays emitted by excited oxygen, nitrogen, carbon and — most recently — boron.



MICRO-X detectors feature minimum dead layer and high resolution.

MICRO-X detectors can be tailor-made to your requirements.

Fusion experiments: Laser induced x-rays are analyzed by four Si (Li) Kevex detectors mounted on a single cryostat. Each detector is multiplexed to yield 4x the count-rate efficiency as compared with one detector.



Fusion experimentors demand state-of-the-art Si (Li) detectors.

More than a score of laboratories use Kevex detectors for quantitative multi-element analysis using high energy particle bombardment. In a simple matrix, as little as 10^{-12} grams of an element can be detected.

Cryostat configurations are optimized for each application.

Kevex large area (500 mm²) low background detectors yield specified resolution of 325 eV FWHM at 5.9 keV.

A matched pair of 500 mm² Si (Li) detectors.

Handbook—X-RAY ENERGY SPECTROMETRY — 160 pages by R. Woldseth, Ph.D. A practical guide on successful applications of x-ray photon spectroscopy. Useful tables, graphs, experimental data, etc. — a single reference source. $7.95 plus 50 cents shipping and handling (overseas — add $3.00 for air parcel post).

For complete details on Kevex Si (Li) detectors, contact:

kevex

KEVEX CORPORATION
Nuclear Physics Division
898 Mahler Road
Burlingame, California 94010, U.S.A.
Telephone (415) 697-6901
TWX 910-371-7249

Circle No. 14 on Reader Service Card

letters

As well as suggesting priorities, the Bromley report sketches the drastic consequences of cuts such as those we face in nuclear sciences for FY 1977. But nuclear sciences is not alone. Government support of basic research has been declining steadily since 1967.[2] We firmly believe the time has come to promote aggressively public and official appreciation of basic research lest its accelerating strangulation continue.

We strongly urge that future funding for all basic research, and nuclear sciences in particular, not be allowed to fall below that of FY 1976, adjusted for inflation.

Feeling as we do on the above issues, we share the concerns expressed by C. S. Wu in her letter to the President.[3] Therefore, we ask you to join us in sending letters of this type to officers of The American Physical Society, Administrators in ERDA and NSF, and to members of Congress.

References

1. Physics Survey Committee, Part II (1973), page 370 (the "Bromley Report," chapter on "Consequences of a Declining Budget").
2. Editorial by C. S. Wu, PHYSICS TODAY, December 1975, page 88.
3. Letter by C. S. Wu, PHYSICS TODAY, January 1976, page 99.

J. C. HILL
W. L. TALBERT, JR
J. P. VARY
S. A. WILLIAMS
F. K. WOHN
Ames Laboratory, ERDA

Limited nuclear war

In an obvious effort to make the limited-war doctrine more acceptable to the developing nations and to others who are convinced that a nuclear war threatens all human life on the planet, the US government requested the National Academy of Sciences to report on the "Long-Term Worldwide Effects of Multiple Nuclear Weapons Detonations" and a study bearing that title was released 4 October, 1975.

The Arms Control and Disarmament Agency, which financed the study, instructed the special committee formed to conduct the study to assume that the entire nuclear exchange would be limited to explosions in the northern hemisphere between latitudes of 30 and 60 degrees in the lower atmosphere over land and that no account be taken of the immediate loss of human life. Such questionable assumptions forced the committee to eliminate from its considerations any possibility of nuclear strikes at surface or underwater naval vessels or space satellites. Also excluded were all military bases or allied nations outside the above-mentioned latitudes. In other words, since the ground rules for the study were apparently based on the Schlesinger doctrine of limited nuclear war, even if they were not spelled out in those terms, it should be no surprise that the study concluded in the words of NAS President Philip Handler "in a decade or so after the event, in areas distant from the detonations, surviving humans and ecosystems would be subject to relatively minimal stress attributable to the exchange."

To minimize the impact of a nuclear exchange on food production, the report states that "Bell and Cole estimate it would require 11 years to rebuild beef and dairy cattle (in the US) in numbers to former levels following a 90% loss of female breeding stock. Similarly, sheep would take seven years, swine one and one-third years and poultry one-half year to rebuild after similar destruction" (page 96). Since the committee was not allowed to make any assumptions about the loss of human life in the nuclear detonations, it did not have to worry about who would organize the breeding. Perhaps the poultry, cattle, sheep, etc., would breed themselves like the Shmoos in the Li'l Abner comic strip.

The report can thus conclude in the paragraph following the one just cited: "It is reasonable to assume that mankind in combatant and noncombatant nations would recover from a nuclear war much as it recovered from other major disasters .... The most productive land would probably be occupied and tilled within a short time after a nuclear exchange."

It is shocking that a number of scientists, many of whom are distinguished in their fields, should find themselves taking part, even unwittingly, in the preparation of this pseudo-scientific, Strangelovian report.

It is the responsibility of scientists to alert the peoples of their countries to the dangers from continued escalation of the arms race, to the dangers from nuclear arms proliferation, and to the dangers of the Schlesinger limited-war concepts. The National Academy of Sciences should be devoting its efforts to meeting these dangers and not to selling the public on the safety of nuclear war.

ERWIN MARQUIT
University of Minnesota
Minneapolis, Minnesota

Monopole debate

I was dismayed to find a statement in your October issue to the effect that "... Julian Schwinger ... developed a consistent theory of monopoles." This statement completely disregards my proof of the noncovariance of the Dirac

continued on page 82