Традиции в използването на трековия метод във Физически факултет при СУ “Св. Климент Охридски”

Д. Пресиянов, К. Митев,

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СУ “Св. Климент Охридски

Първи опити

Първи опити в приложението на метода:

Търсене на свръхтежки елементи в природата

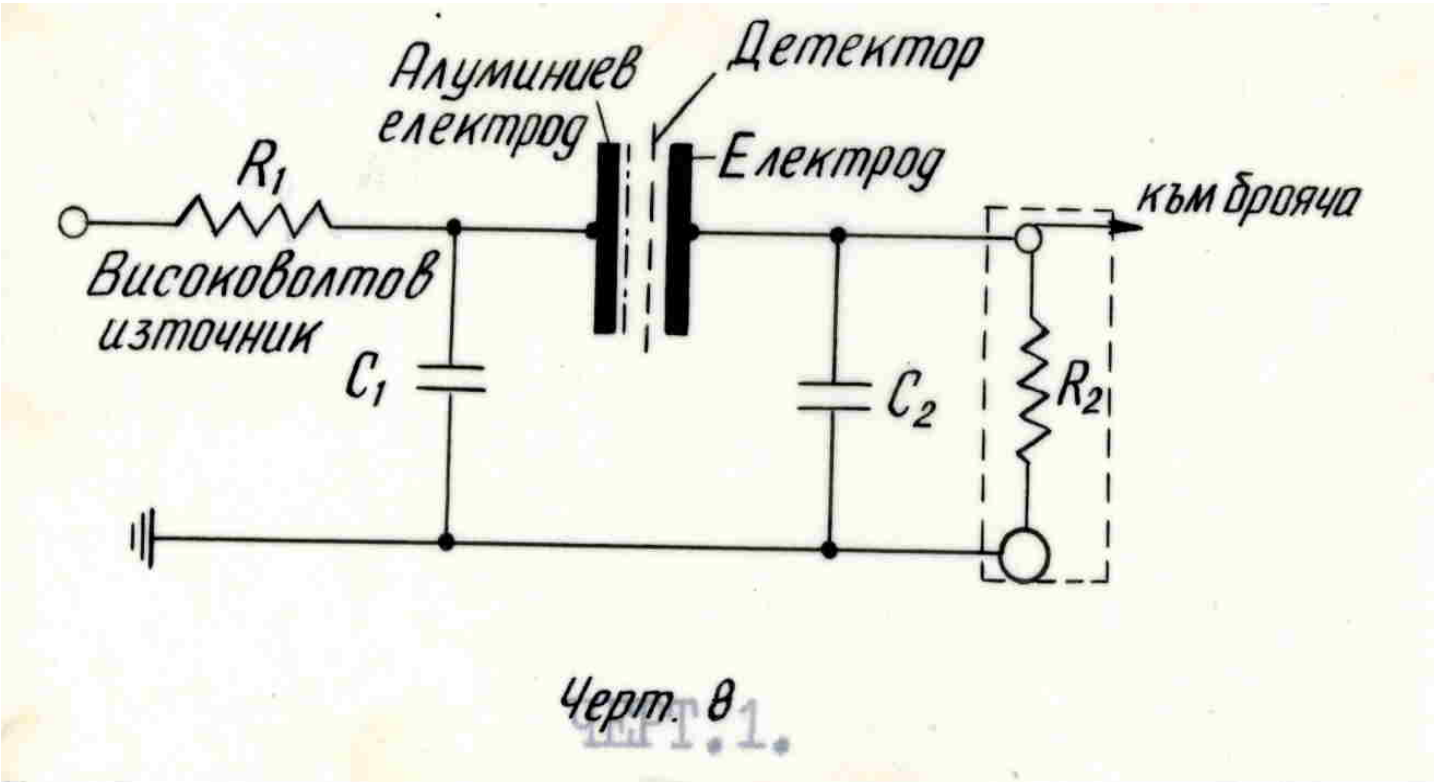
(Цв. Бончев и Ст. Пенева)

Ранни опити

През 70-те години в катедра “Атомна физика”:

- **Опити да се синтезира материал, подоходящ за използване като треков детектор (нитроцелулоза, триацетатна целулоза)**
- **Изследва се ефективността на регистрация на алфа частици с някои трекови детектори (на нитроцелулозна основа)**
- **Конструира се опитна постановка за искрово броене на следи**

Ранни опити



Черт. 8

Ранни опити

Nuclear Instruments and Methods in Physics Research A 337 (1993) 204–210
North-Holland

NUCLEAR
INSTRUMENTS
& METHODS
IN PHYSICS
RESEARCH
Section A

A rapid method for investigation of surface alpha-contamination

T. Bonchev, E.I. Vapirev, F. Helal, V. Jordanov and T. Semova
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Received 4 May 1993 and in revised form 22 July 1993

Използване на трековия метод в лаборатория Дозиметрия и лъчезащита

През 90-те години в Лаборатория Дозиметрия и лъчезащита трековия метод започва да се прилага в областта на Дозиметрията – главно в проблематиката свързана с радона

Използване на трековия метод в лаборатория Дозиметрия и лъчезащита

INTEGRATED MEASUREMENTS OF ^{212}Pb AND ^{212}Bi IN THE AIR BY ROTATING FILTERS

Dobromir S. Pressyanov*

Използване на трековия метод в лаборатория Дозиметрия и лъчезащита

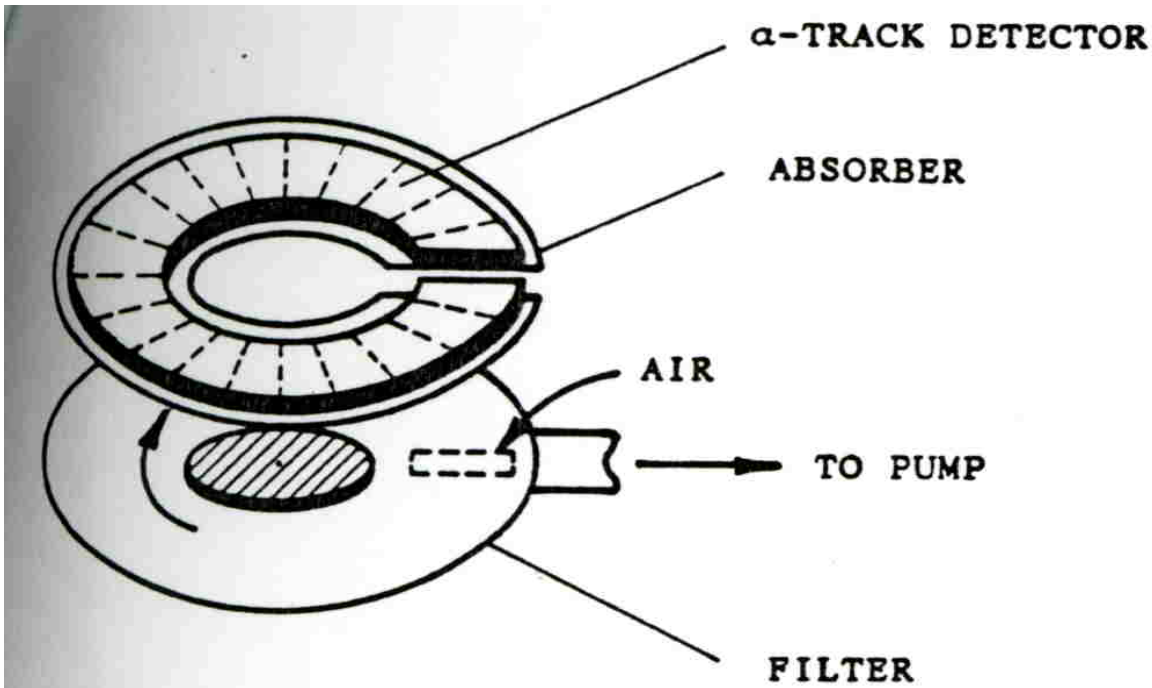
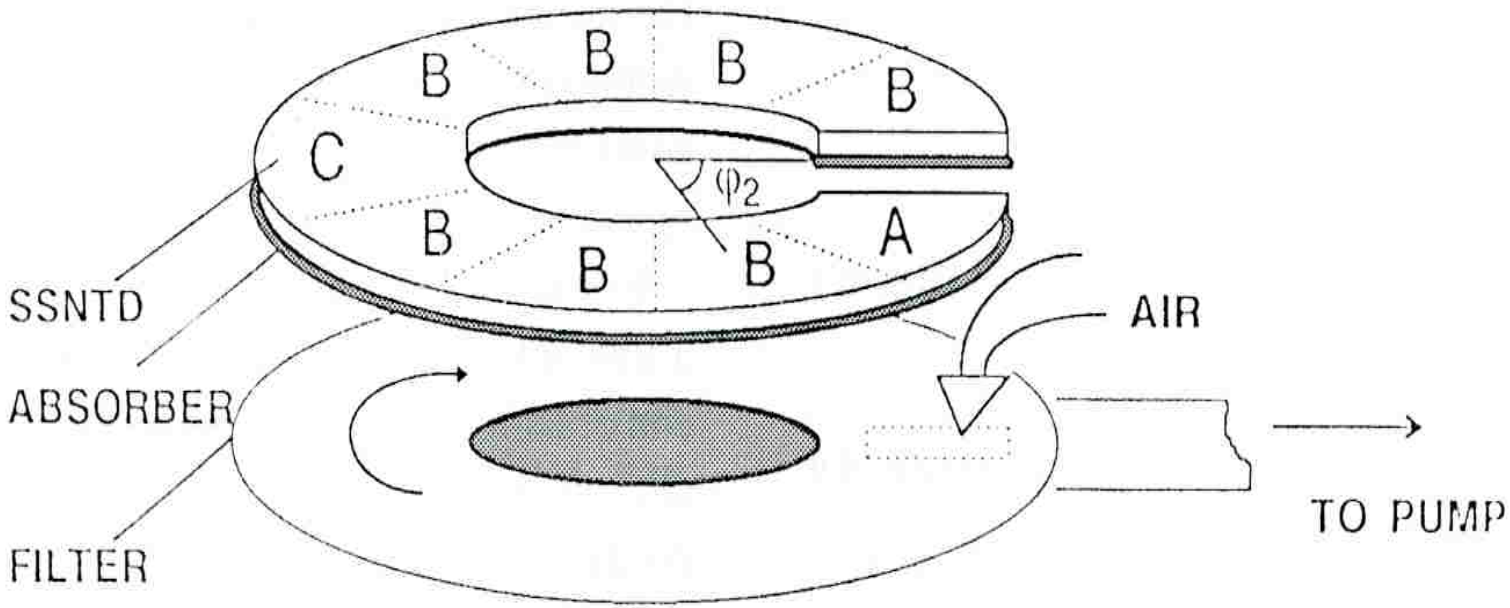


Fig. 1. A principal scheme of the dosemeter used. Each point of the uniformly rotating filter consecutively passes by the inlet nozzle and the different sectors (each considered a separate detector) of LR 115-II film. The film is covered with 11.7 mg cm^{-2}-thick aluminum absorber.

Използване на трековия метод в лаборатория Дозиметрия и лъчезащита



Използване на трековия метод в лаборатория Дозиметрия и лъчезащита

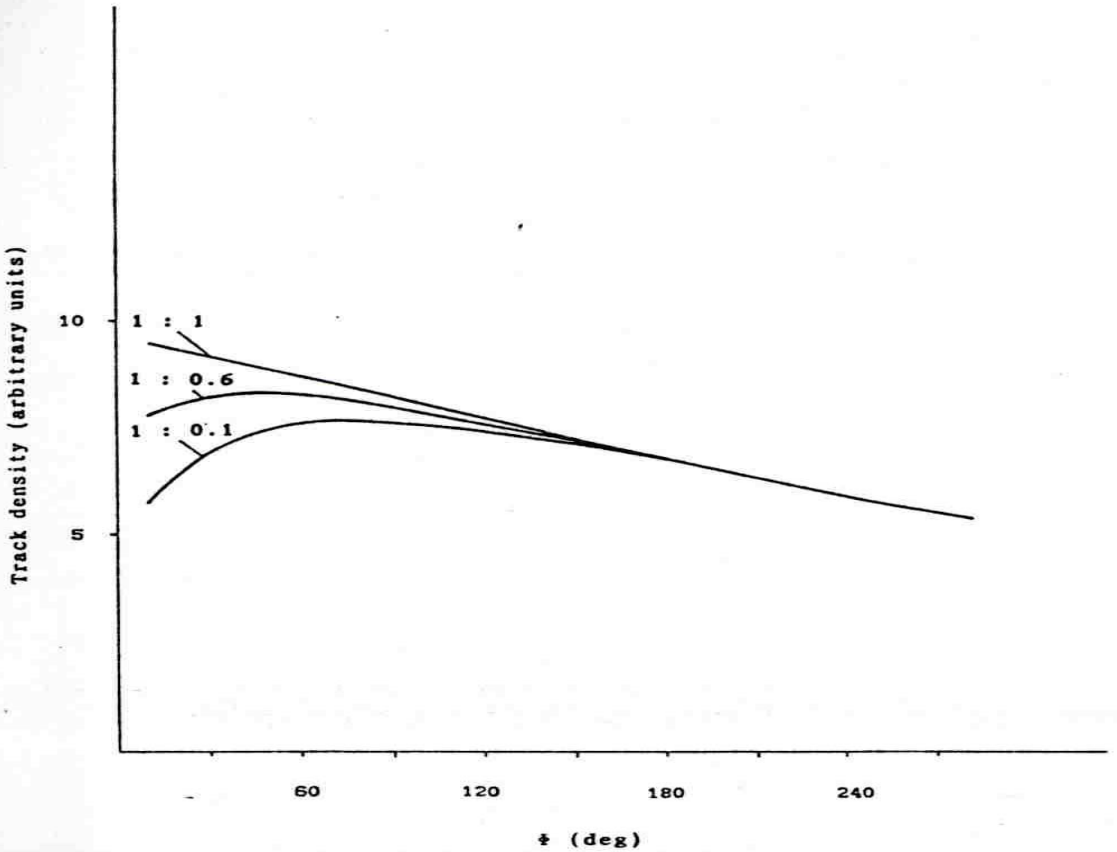


Fig. 2. A theoretical dependence of track density on the angular position of the detector's center. The activity ratios (^{212}Pb:^{212}Bi) are shown.

Използване на трековия метод в лаборатория Дозиметрия и лъчезащита

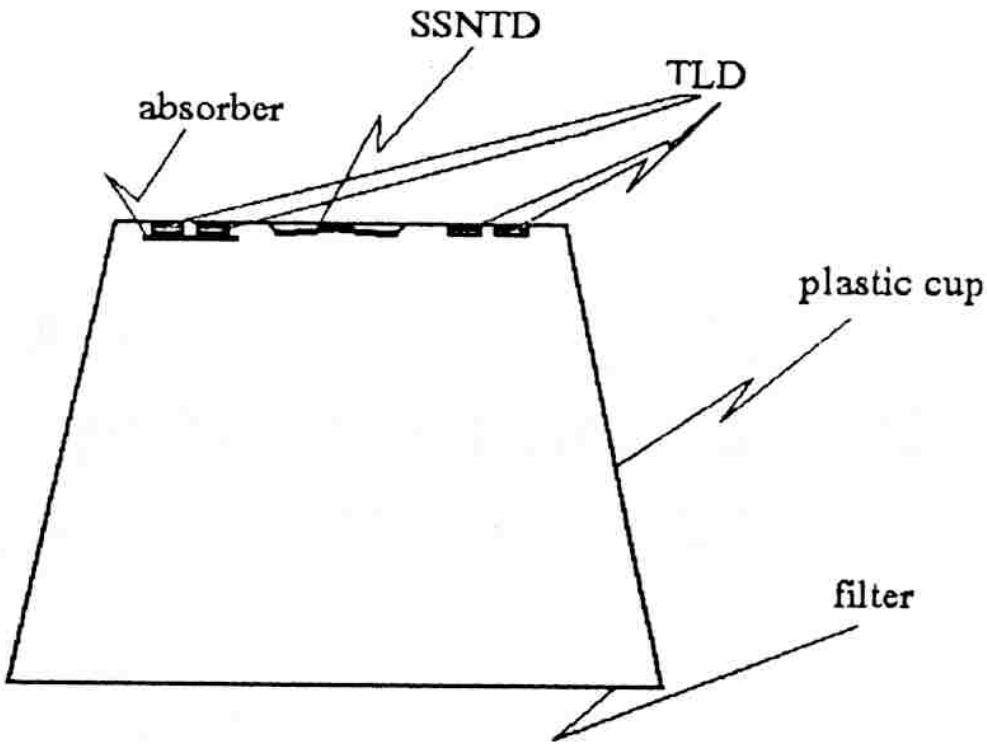
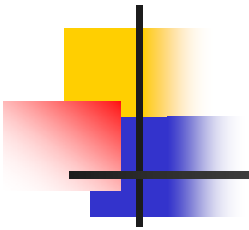
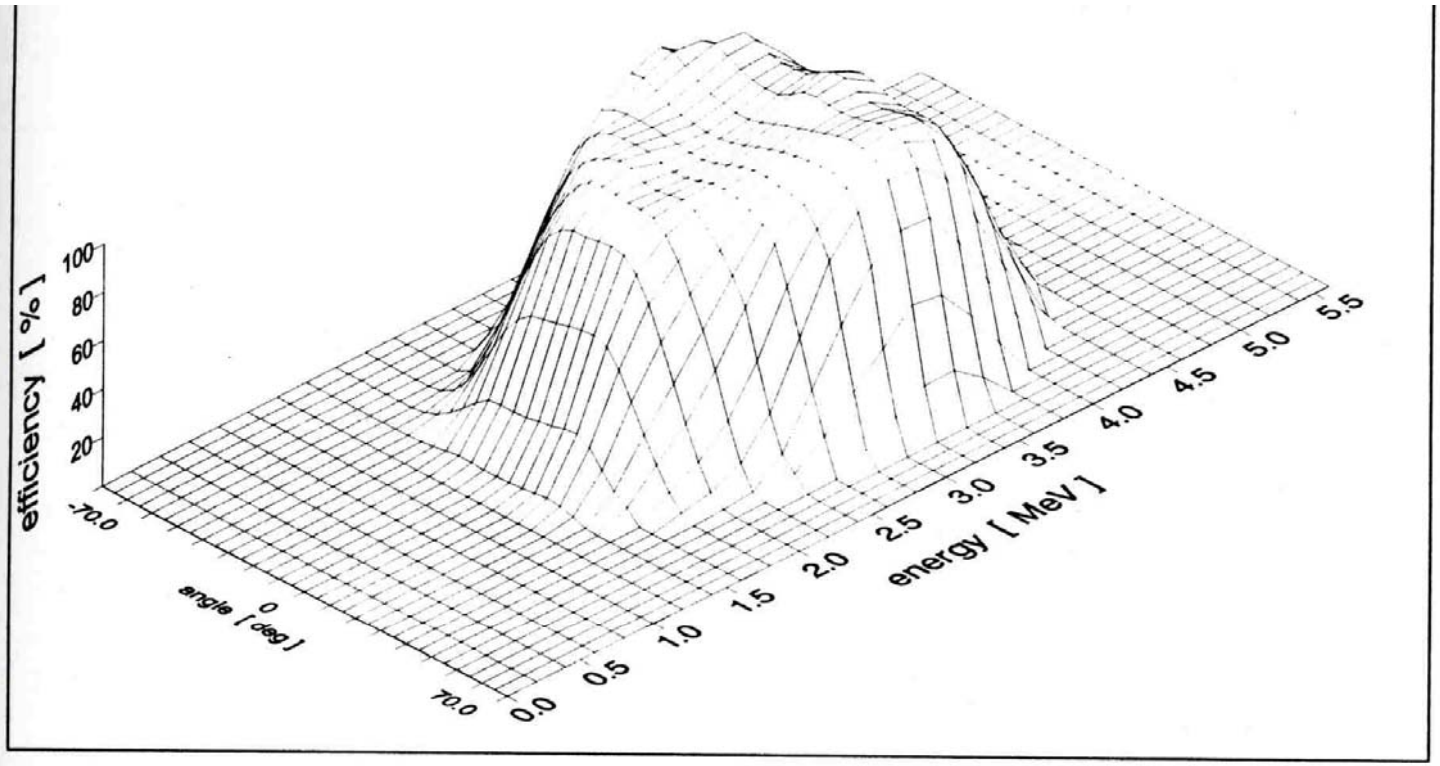


Fig. 1. A scheme of a filtered cup, with both TLDs and SSNTDs placed inside.



Методично и метрологично осигуряване на трековия метод

Методично и метрологично осигуряване на трековия метод



Фиг. 15 Енергетично-ъглова чувствителност $\varepsilon(E,\theta)$ за време на ецване $t_{etc}=120$ *min.*

Методично и метрологично осигуряване на трековия метод

ELSEVIER

Nuclear Instruments and Methods in Physics Research A 435 (1999) 509–513

NUCLEAR INSTRUMENTS & METHODS IN PHYSICS RESEARCH Section A

www.elsevier.nl/locate/nima

Radon progeny deposition in track-detection diffusion chambers

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Received 21 August 1998; received in revised form 11 March 1999; accepted 24 May 1999

Методично и метрологично осигуряване на трековия метод

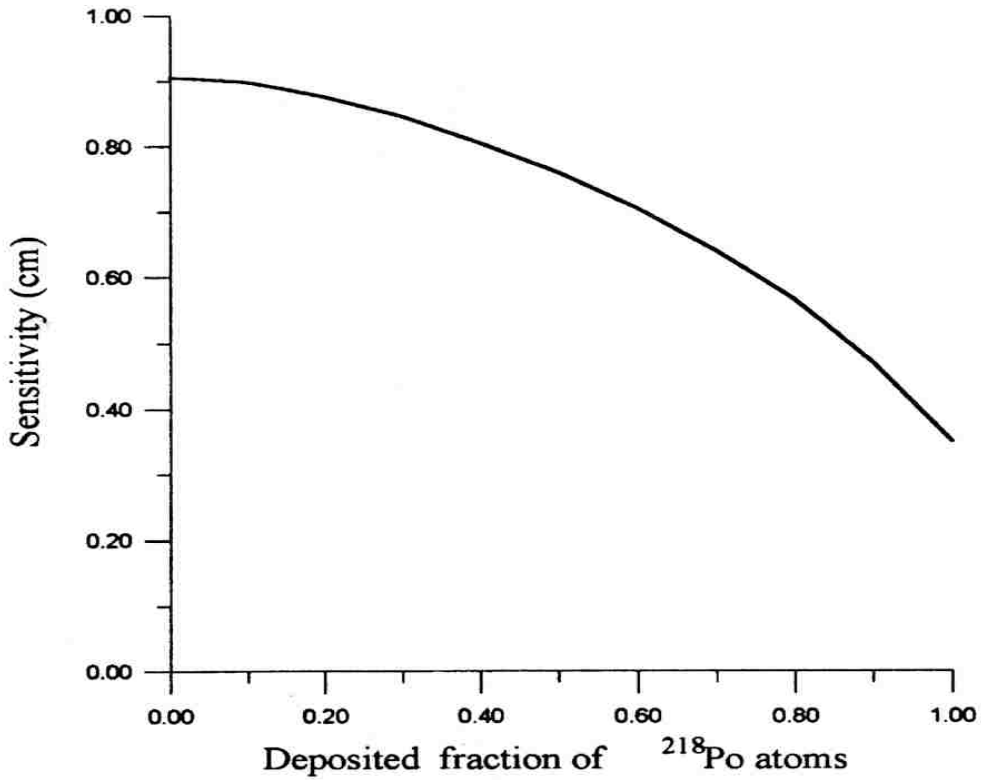

Fig. 2. Sensitivity as dependent on the deposited fraction of ^{218}Po atoms for chambers of size $d = 8$ cm and $h = 7.5$ cm.

Методично и метрологично осигуряване на трековия метод

Dept. of Radiation Dosimetry
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St. Kliment Ohridski Univ. of Sofia
5 James Bourchier Blvd.
Sofia BG-1164
Bulgaria

1 June 1998

PROTOCOL

for comparative integrated measurements of ^{222}Rn

According to the agreement between Laboratory of Dosimetry and Radiation Protection at St. Kliment Ohridski University of Sofia and Dept. of Radiation Dosimetry at the Nuclear Physics Institute, CAS, Prague comparative integrated measurements of ^{222}Rn were made. Four Bulgarian and five Czech devices were exposed for time interval of 19.75 days to ^{222}Rn under artificially created conditions (radon box). Bulgarian devices were diffusion chambers with Kodak-Pathe LR-115 II detectors, the Czech ones were gap-holders with CR-39 detectors. Referent measurements were made by calibrated electret ionisation chamber **E-Perm** (made in USA). The following results for the mean ^{222}Rn concentrations were obtained:

Czech devices		**Bulgarian devices**	
detector	mean ^{222}Rn [kBq m^{-3}]	detector	mean ^{222}Rn [kBq m^{-3}]
d=1.3A	42.2 ± 1.5	1	44.3 ± 9%
d=1.3B	37.3 ± 0.8	2	52.6 ± 8%
d=1.5	38.6 ± 0.2	3	40.5 ± 13%
d=1.7	37.1 ± 2.5	4	43.2 ± 7%
d=1.8	33.1		
average	37.7 ± 3.9%		45.1 ± 5.8%

Методично и метрологично осигуряване на трековия метод

PERGAMON

Applied Radiation and Isotopes 52 (2000) 427–434

Applied Radiation and Isotopes

www.elsevier.com/locate/apradiso

A radon 222 traceability chain from primary standard to field detectors

J.L. Picolo[a,*], D. Pressyanov[b], P. Blanchis[a], M. Barbier[a], N. Michielsen[c], D. Grassin[c], V. Voisin[c], K. Turek[d]

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[d]*Department of Radiation Dosimetry, Institute of Nuclear Physics, Czech Academy of Sciences, Prague, Czech Republic*

Accepted 1 July 1999

Методично и метрологично осигуряване на трековия метод

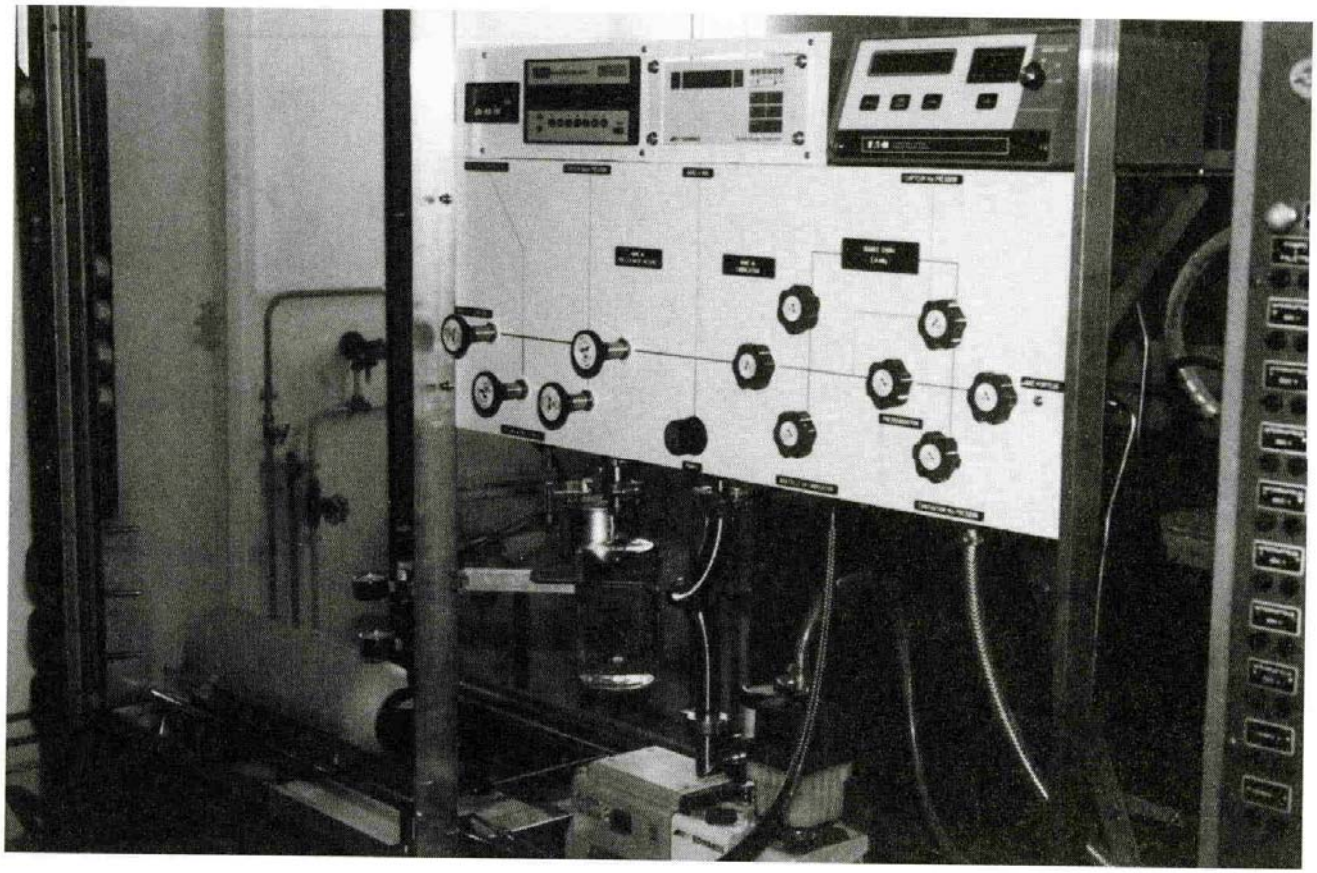

Fig. 3. Dynamic secondary standards preparation bench.

Методично и метрологично осигуряване на трековия метод

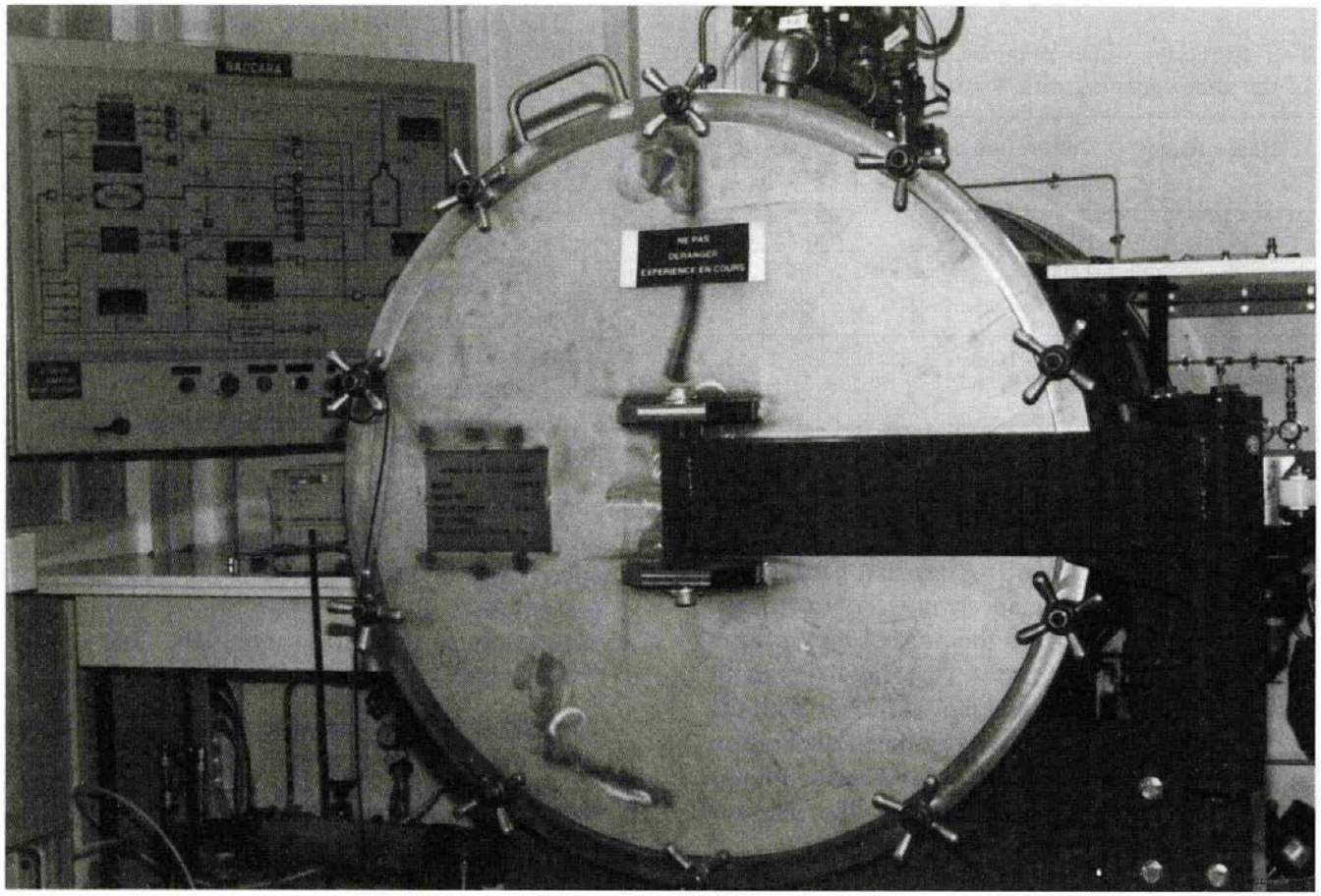

Fig. 4. Baccara Calibration Bench.

Методично и метрологично осигуряване на трековия метод

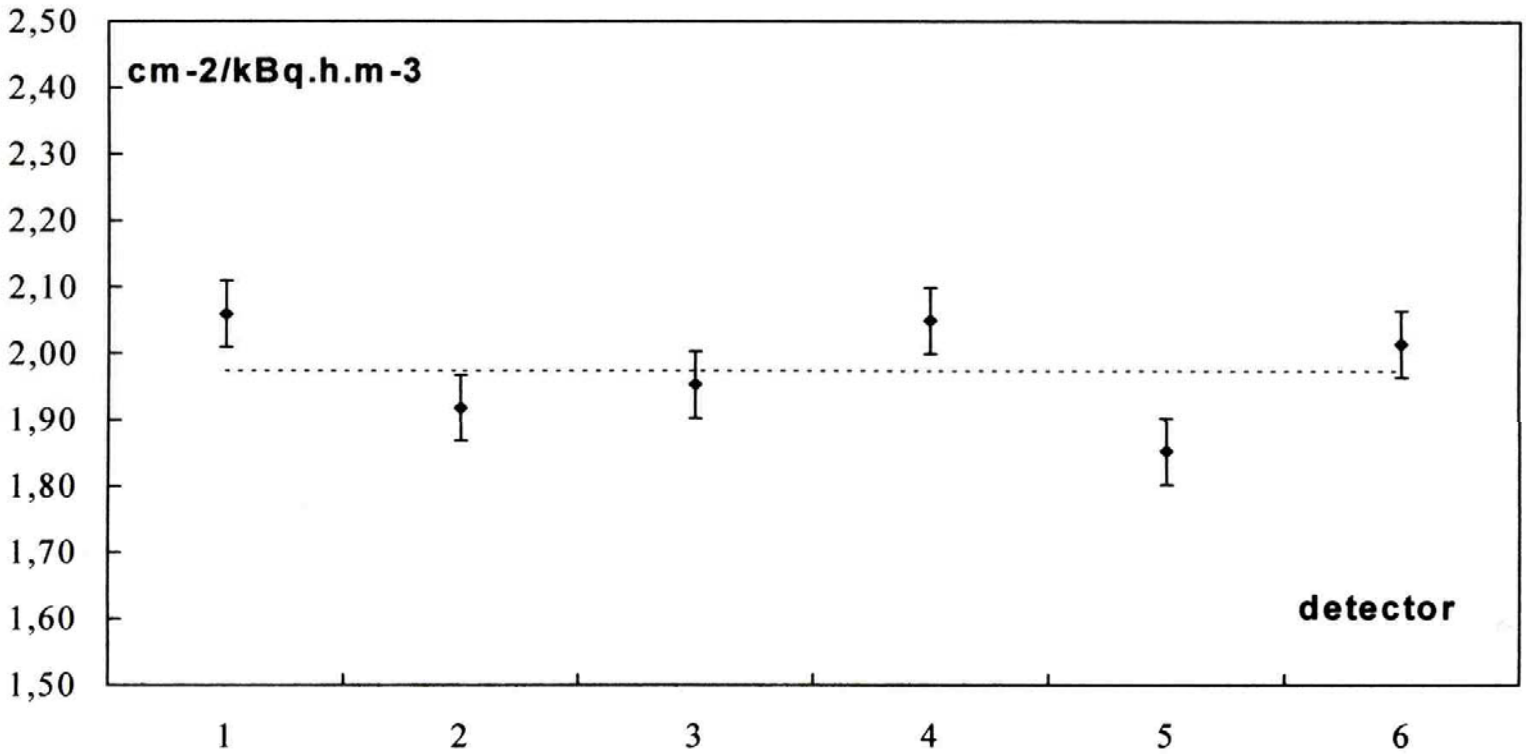

Fig. 5. Results of the individual calibration coefficients of the diffusion chambers ($C_F \pm 1\sigma$).

Важни радиологични проблеми в България, установени или изследвани с трековия метод

Радиологични проблеми в България, изследвани или установени с трековия метод

Pergamon

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1352–2310(95)00204–9

RADON AND RADON PROGENY OUTDOORS IN A VALLEY OF ENHANCED NATURAL RADIOACTIVITY

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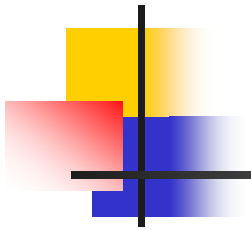
BORISLAV G. SHARKOV
Eleshnitsa BG-2782, Bulgaria

Радиологични проблеми в България, изследвани или установени с трековия метод

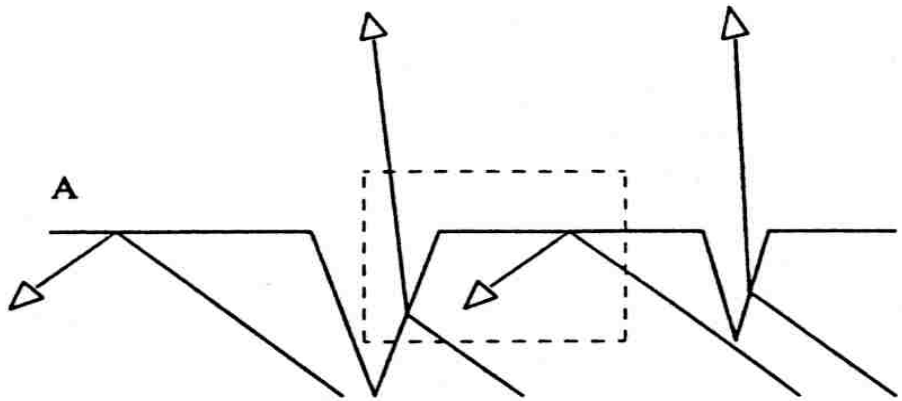
LETTER

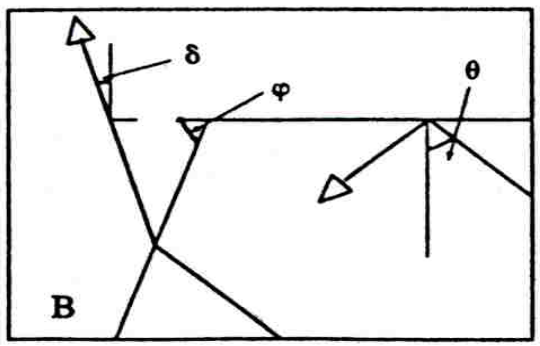
Excess lung cancer incidence and radon indoors in a Bulgarian town



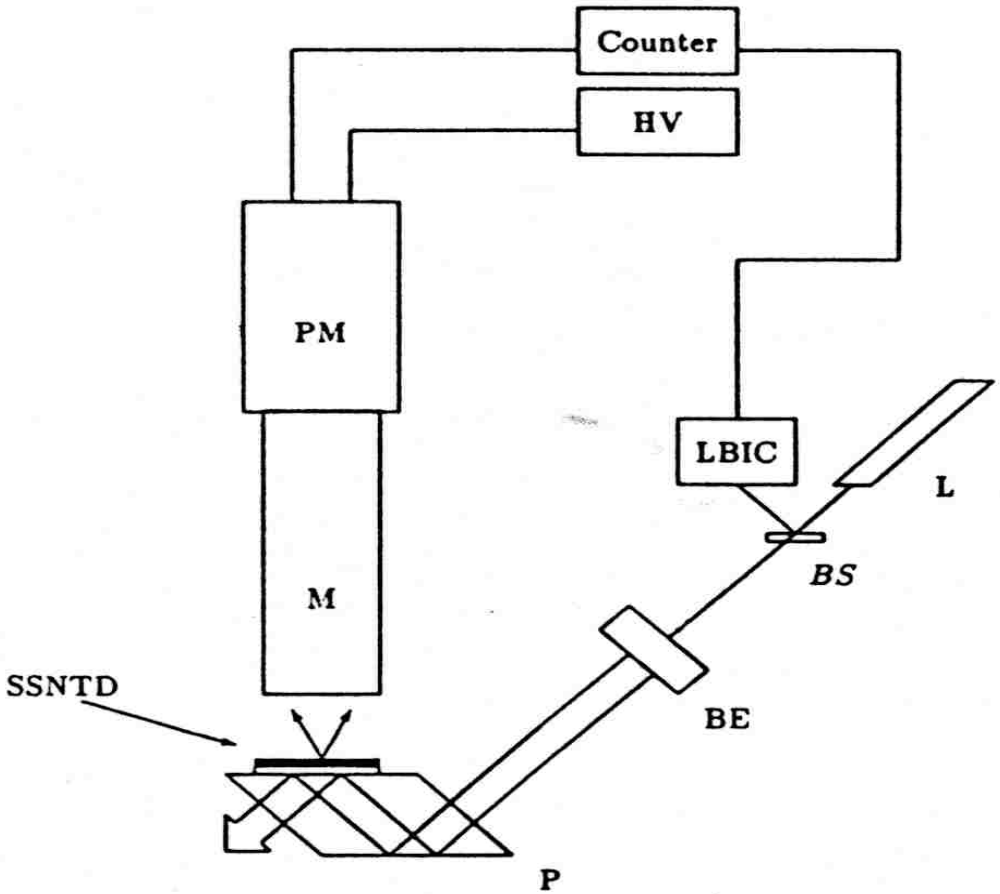
Автоматизиране на броенето на следи (трекове)

Автоматизиране на броенето на следи (трекове)





Автоматизиране на броенето на следи (трекове)



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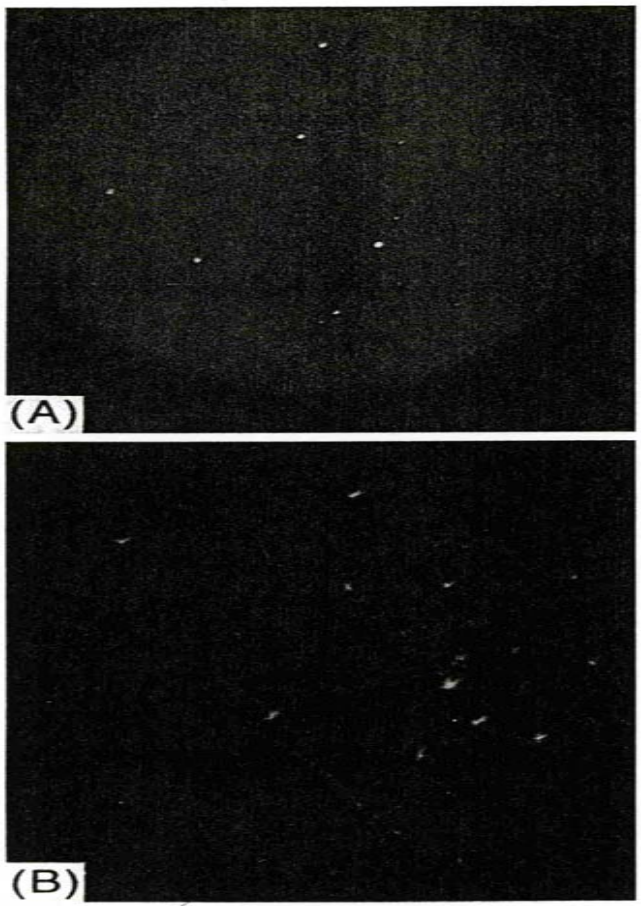

Fig. 3. A photograph of the same detector's field under different conditions: (A) in a transmitted light with a green filter; (B) in a laser light, through the approach proposed.

Автоматизиране на броенето на следи (трекове)

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SCIENCE DIRECT

Radiation Measurements

Radiation Measurements 39 (2005) 557–559

www.elsevier.com/locate/radmeas

Short communication

Automatic counting of chemically etched tracks by means of a computer scanner

L. Tsankov[a,*], D. Pressyanov[b], K. Mitev[b], S. Georgiev[b], I. Dimitrova[b]

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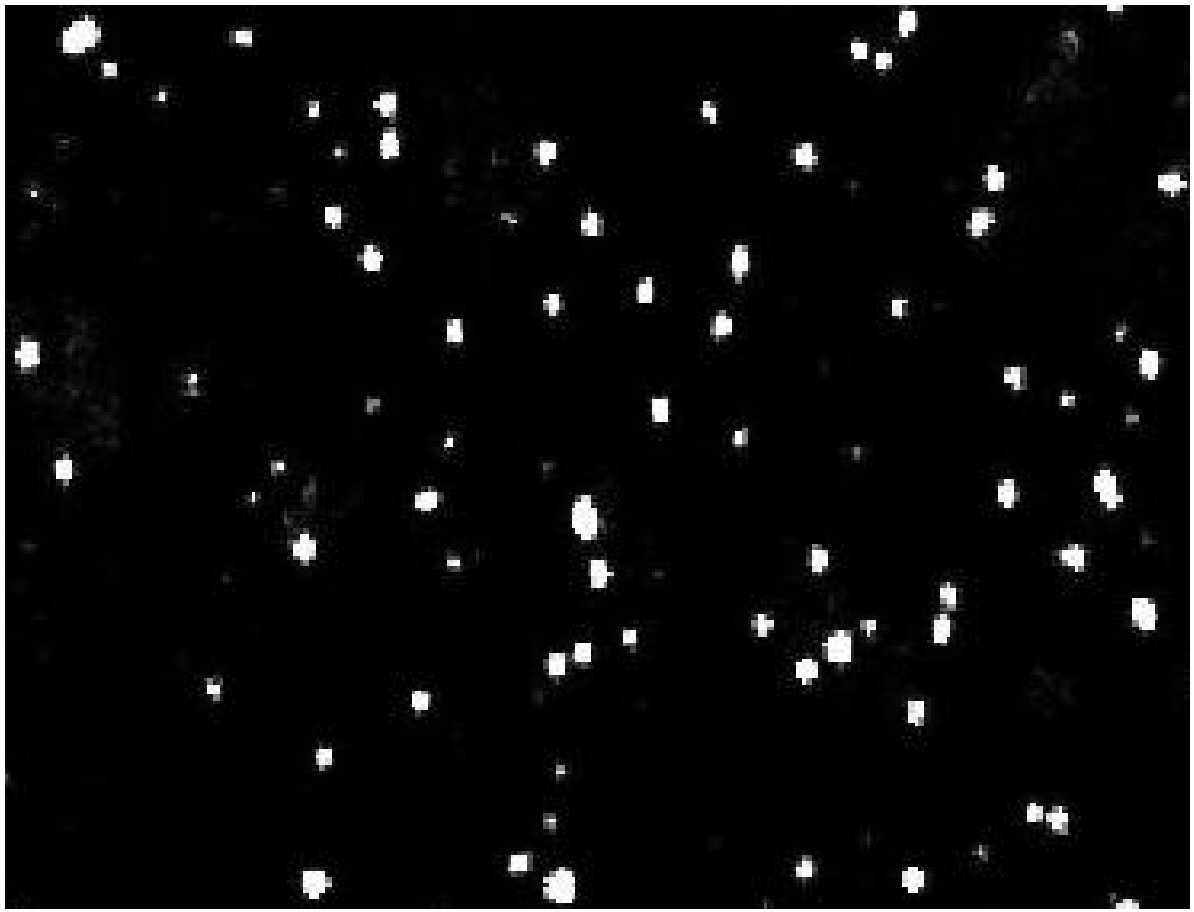
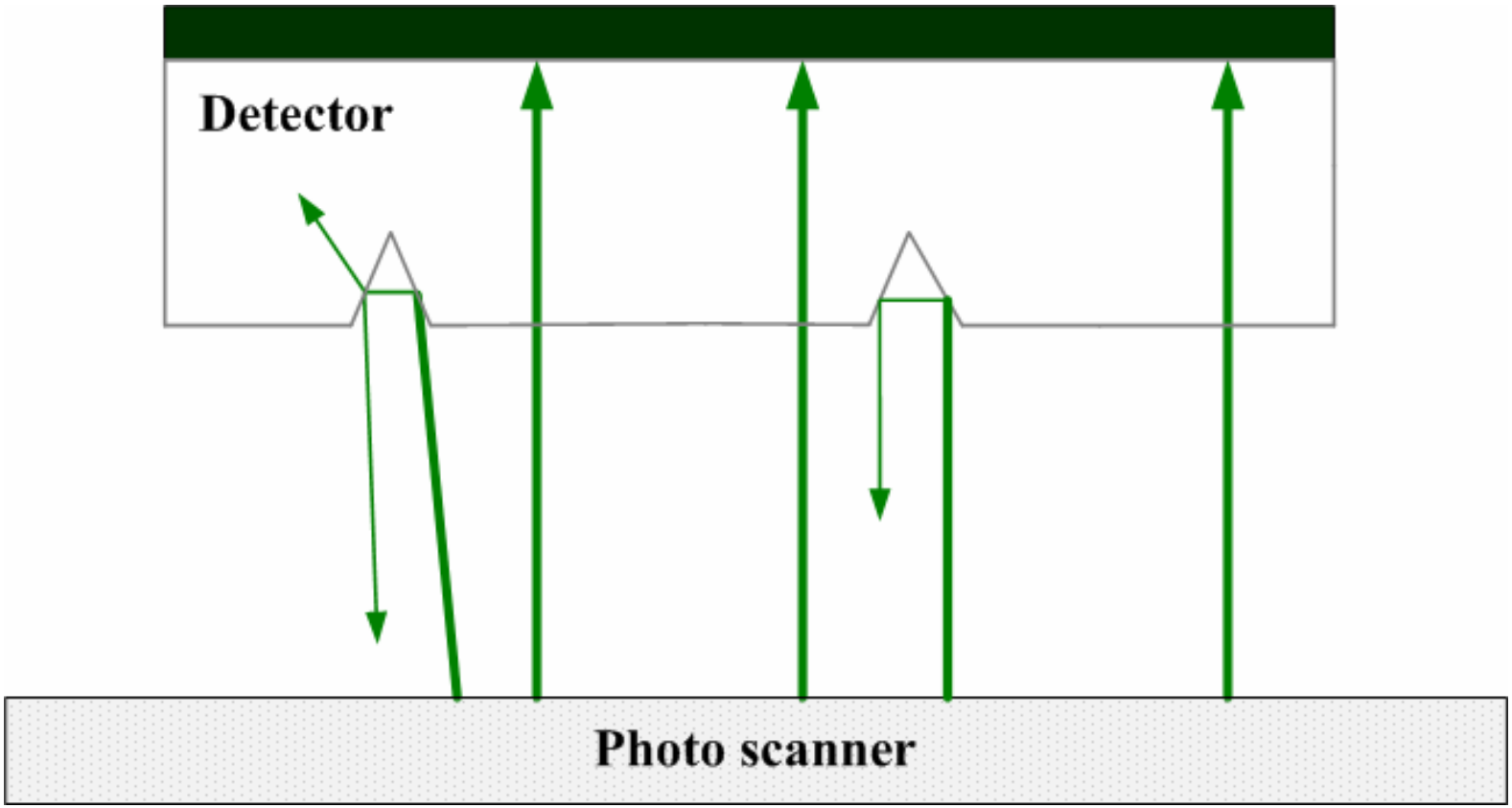
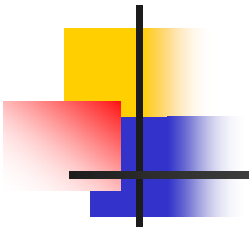
Автоматизиране на броенето на следи (трекове)



Автоматизиране на броенето на следи (трекове)





Перспективни направления за бъдещи изследвания и приложения

Перспективни направления за бъдещи изследвания и приложения

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Nuclear Instruments and Methods in Physics Research A 457 (2001) 665–666

NUCLEAR INSTRUMENTS & METHODS IN PHYSICS RESEARCH Section A

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Letter to the Editor

Indoor radon detected by compact discs

D. Pressyanov[a,*], J. Buysse[b], A. Van Deynse[b], A. Poffijn[b], G. Meesen[b]

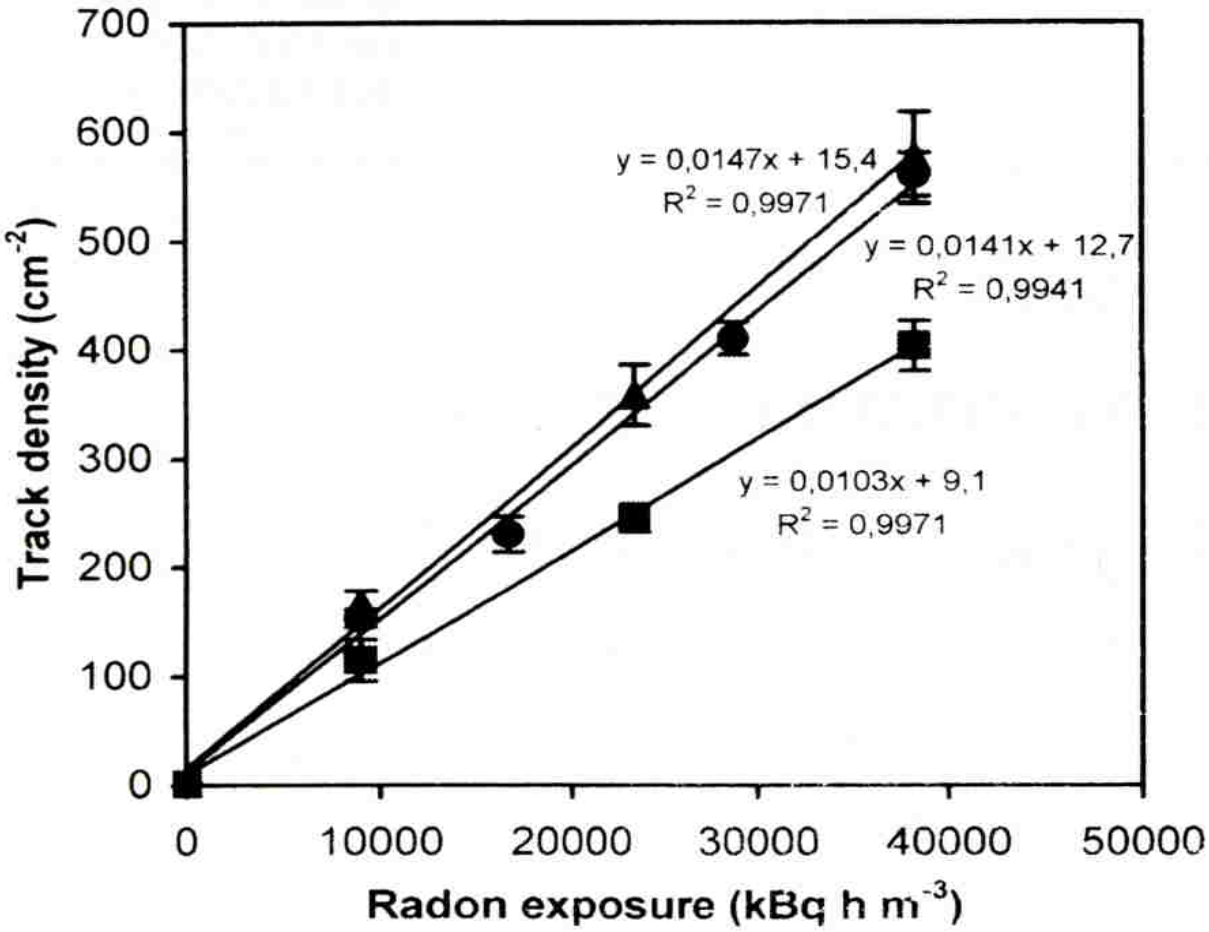
[a]*Faculty of Physics, St. Kliment Ohridski University of Sofia, Department of Atomic Physics, 5 James Bourchier Blvd., BG-1164 Sofia, Bulgaria*

[b]*Department of Subatomic and Radiation Physics, University of Ghent, Proeftuinstraat 86, B-9000 Ghent, Belgium*

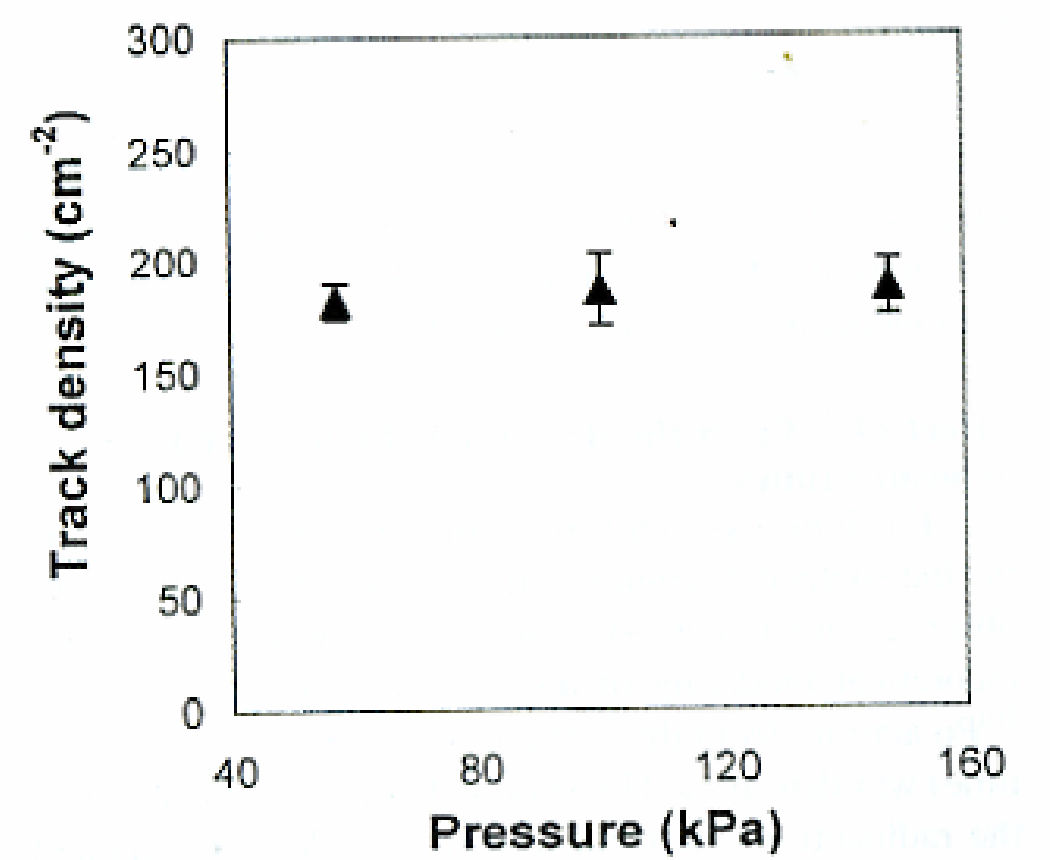
Received 7 June 2000; accepted 10 July 2000

Перспективни направления за бъдещи изследвания и приложения

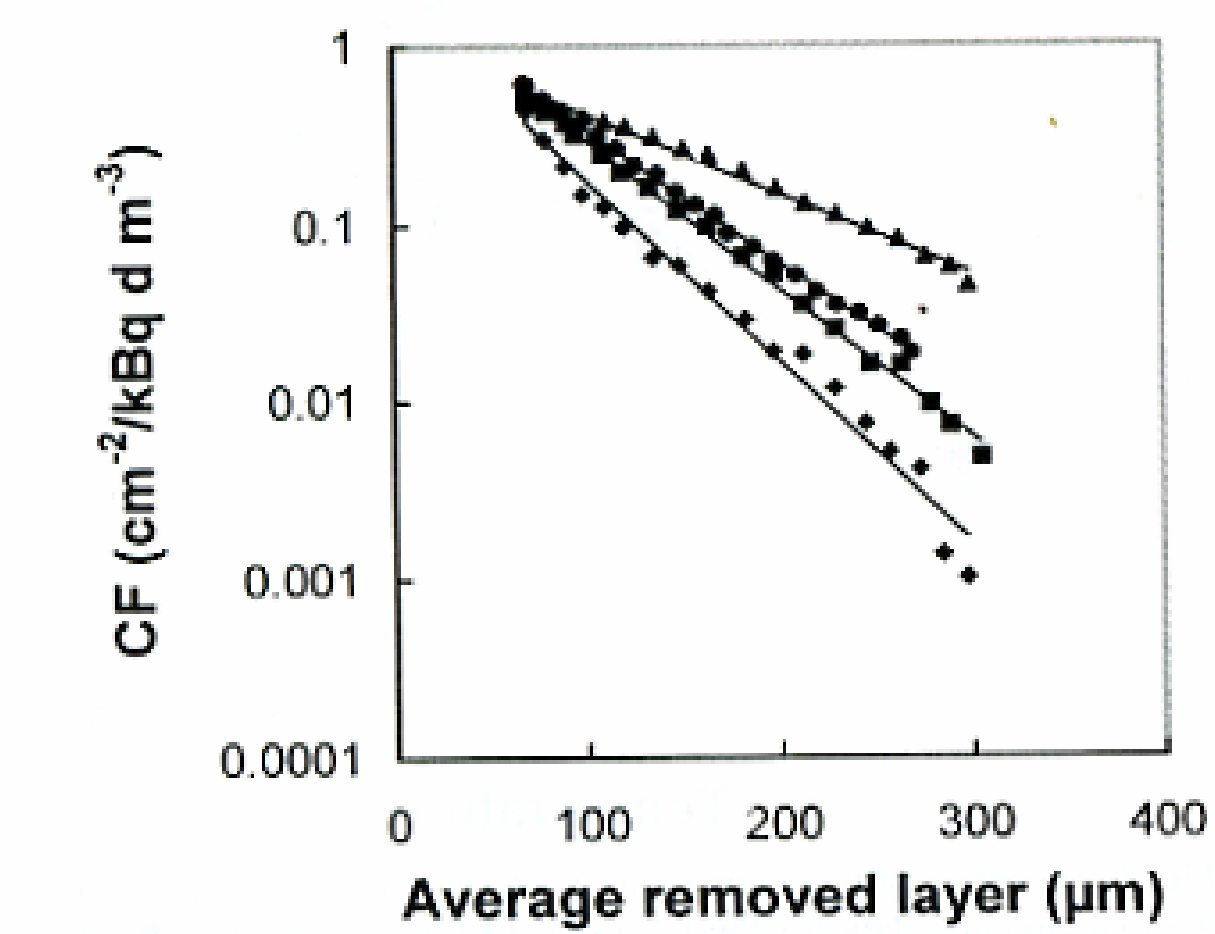
Перспективни направления за бъдещи изследвания и приложения



Перспективни направления за бъдещи изследвания и приложения



Перспективни направления за бъдещи изследвания и приложения



Перспективни направления за бъдещи изследвания и приложения

Table 1. Range of sensitivity for 10 y exposure time.

Detector	MDA (Bq m^{-3})	Saturation level (corresponding to 4,000 cm^{-2}) (Bq m^{-3})
CDs at 83 μm	2.9	3,000
CDs at 117 μm	4.0	4,100

Перспективни направления за бъдещи изследвания и приложения

OF NOTE

ENVIRONMENT

Second cancer type linked to shift work

Two years ago, a pair of research teams each reported finding an elevated risk of breast cancer among women who sometimes worked nightshifts. One of the teams now finds that those women also face an increased risk of colorectal cancer.

Eva S. Schernhammer of Brigham and Women's Hospital in Boston and her colleagues pored over data on 600 colorectal cancers diagnosed among 78,500 nurses participating in a long-running health study. As before, the researchers compared cancer incidence in women who reported working the graveyard shift with that of women who never worked nights.

In the June 4 *Journal of the National Cancer Institute*, the epidemiologists report finding a 35 percent higher risk of colorectal cancer among workers who pulled night duty several times a month for at least 15 years.

Schernhammer's team suspects this link may trace to a reduced secretion of the hormone melatonin by the brains of people working nights. Melatonin is produced mainly when a person is in darkness. Several recent studies showed that colon cancer patients tend to secrete less melatonin than healthy people do. Animal studies have also indicated that melatonin can inhibit the development of cancer (*SN: 10/2/99, p. 221*). —J.R.

EARTH SCIENCE

Satellites show Earth is greener

Daily observations from space for nearly 2 decades indicate that our planet is getting greener.

Satellites gathered data from 1982 to 1999, measuring the amount of chlorophyll on Earth. Analyses show that Earth's net primary production—a measure of how much foliage plants generate and, by inference, the amount of carbon dioxide they absorb—jumped about 6 percent over the period. On a global basis, land plants pulled 12.5 billion metric tons more carbon dioxide from the air in 1999 than they did 18 years earlier, says Ramakrishna R. Nemani of the University of Montana in Missoula.

Although the concentration of carbon dioxide in Earth's atmosphere rose about 9 percent during that period, not all of the extra greenery stemmed from that gas' fertilizing effect. For example, large swaths of India received extra rainfall in the 1990s from that decade's strong monsoons, says Nemani. Also, decreased cloud cover over Amazonian rain forests enabled the trees there to slurp up 5 billion more metric tons of carbon dioxide in 1999 than they did in 1982.

WINNERS AND LOSERS In 1999, rain forests in central Africa and the Amazon produced more vegetation (green shades) in the early 1980s. Siberia and southern China, on the other hand, produced less greenery (red shades) in 1999.

Net primary production in some regions did decline from 1982 to 1999. Cooling in Siberia led to a shorter growing season there, and a drop in precipitation in northern Mexico and the southwestern United States stunted growth of vegetation.

Nemani and his colleagues report their analyses in the June 6 *Science*. —S.P.

ZOOLOGY

Sumo wrestling keeps big ants in line

In a Malaysian ant species, scientists are reporting that the large workers fight among themselves in "spectacular shaking contests."

The workers of *Acanthomyrmex ferox* include a class of extra-large hulks, called majors. These female ants do the tough jobs, such as cracking seeds and defending the colony. Like the queen, these workers have six egg-producing organs, whereas smaller workers in the colony have two egg organs. While the queen is alive, the workers' eggs are nonviable and serve as a food source.

The possibility for conflicts involving majors intrigued Bruno Gobin of Catholic University of Leuven in Belgium and Fumiori Ito of Kagawa University in Miki, Japan. In more than 500 hours of videotaping *A. ferox* colonies, the researchers caught 79 of what they delicately call "interactions." In some of these situations, majors engaged in antennal boxing, with one major hammering its antennae against another's body. More dramatic were episodes of a major mounting its forelegs on the head of another and then rocking furiously, rattling its target.

Shaking bouts have a flavor of sumo wrestling, the researchers say in an upcoming *Naturwissenschaften*. The majors established a stringent pecking order on the basis of these bouts.

To see how majors behave during a crisis, Gobin and Ito removed the queen from four colonies. Majors clashed more frequently, but the pecking order stayed the same. Also, the big workers began laying viable but unfertilized eggs, which turn into males. High-ranking majors produced more eggs than lowly ones. No major mated and became a queen, but the top major patrolled the doomed colony and ate the others' eggs. —S.M.

HEALTH PHYSICS

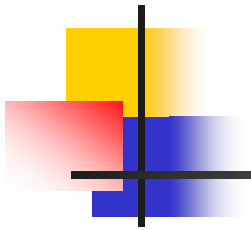
Monitoring radiation with Britney Spears?

Here's a potential use for unwanted or damaged compact disks: Set them aside as home radon detectors.

Radon is a radioactive gas that can accumulate in homes as it seeps from the soil or from building material, such as stone. Some studies have suggested that the alpha particles ejected when radon decays may rank second only to tobacco smoke as a source of lung cancer (*SN: 8/15/87, p. 105*).

Now for the CD connection. Dobromir S. Pressyanov of the St. Liment Ohridski University of Sofia, Bulgaria, and his colleagues investigated the capability of alpha particles to mark plastic as they collide with it. In the May *Health Physics*, the physicists describe exposing compact disks made from polycarbonate plastic to known quantities of radon. After a day, the researchers removed each disk's surface to a depth at which only alpha particles would have left a mark. Then they chemically treated the newly exposed plastic to enlarge each mark enough to make it visible with a regular microscope.

The density of the marks accurately indicated the amount of radon exposure, whether or not the disks had been inside plastic jewel cases, the researchers report. The data indicate that if the age of a disk and average temperature of a home were known, measurements of alpha particle



Благодаря за вниманието