

**«AREAL ULTRAFAST BEAM
APPLICATION FOR
MODELING THE
MICROORGANISMS
SURVIVAL IN SPACE»**

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LABORATORY (YERPFI) Foundation**

- **Are we alone in the Universe or there are other civilizations?**
- **How to contact them?**
- **What will bring to humanity the contact with them?**

Version of Rudolph Peshek

Communication with

Extra

Terrestrial

Intelligence

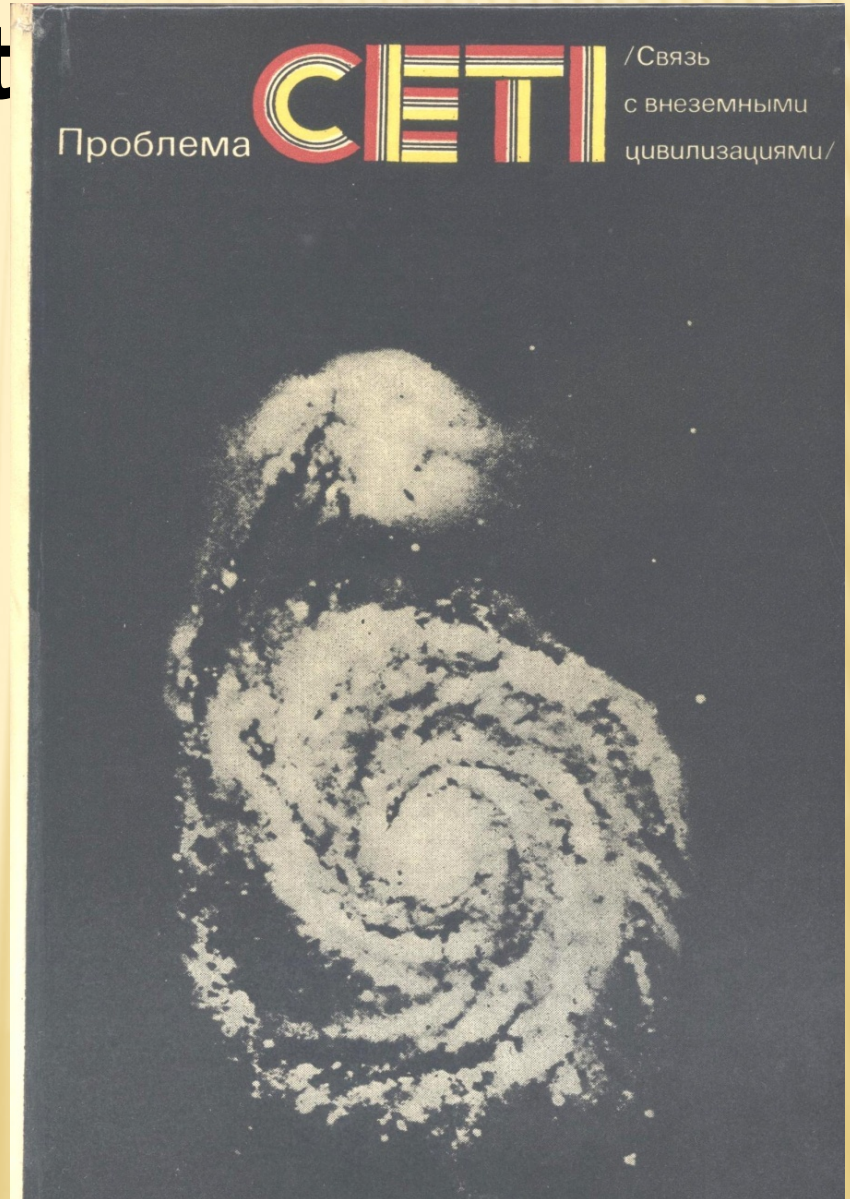
Up-to-date **V**ersion

Search for

Extra

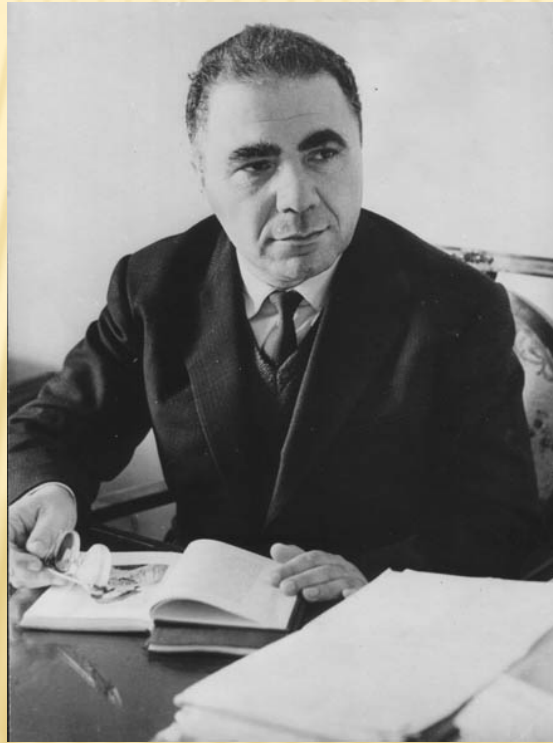
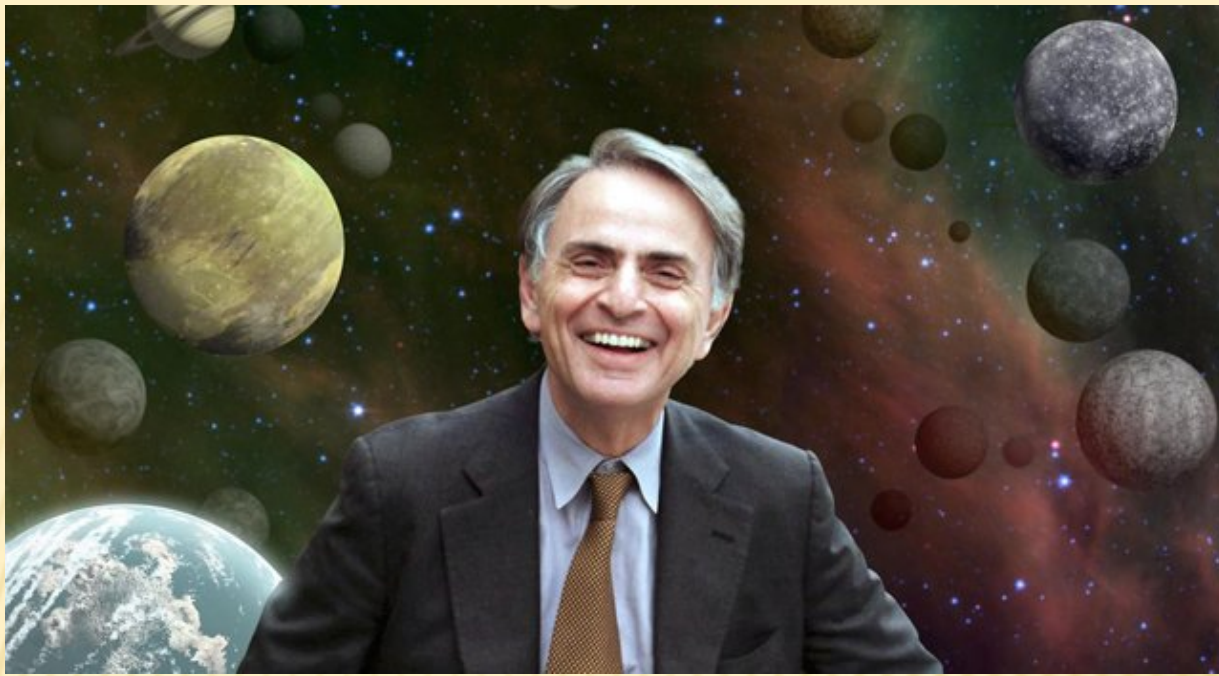
Terrestrial

Intelligence



The image features three grey, alien-like heads with large, black, almond-shaped eyes. They are set against a purple gradient background. The central head is the largest and most prominent, while the two flanking heads are smaller and positioned slightly behind it. The overall aesthetic is that of a digital illustration or a computer-generated scene.

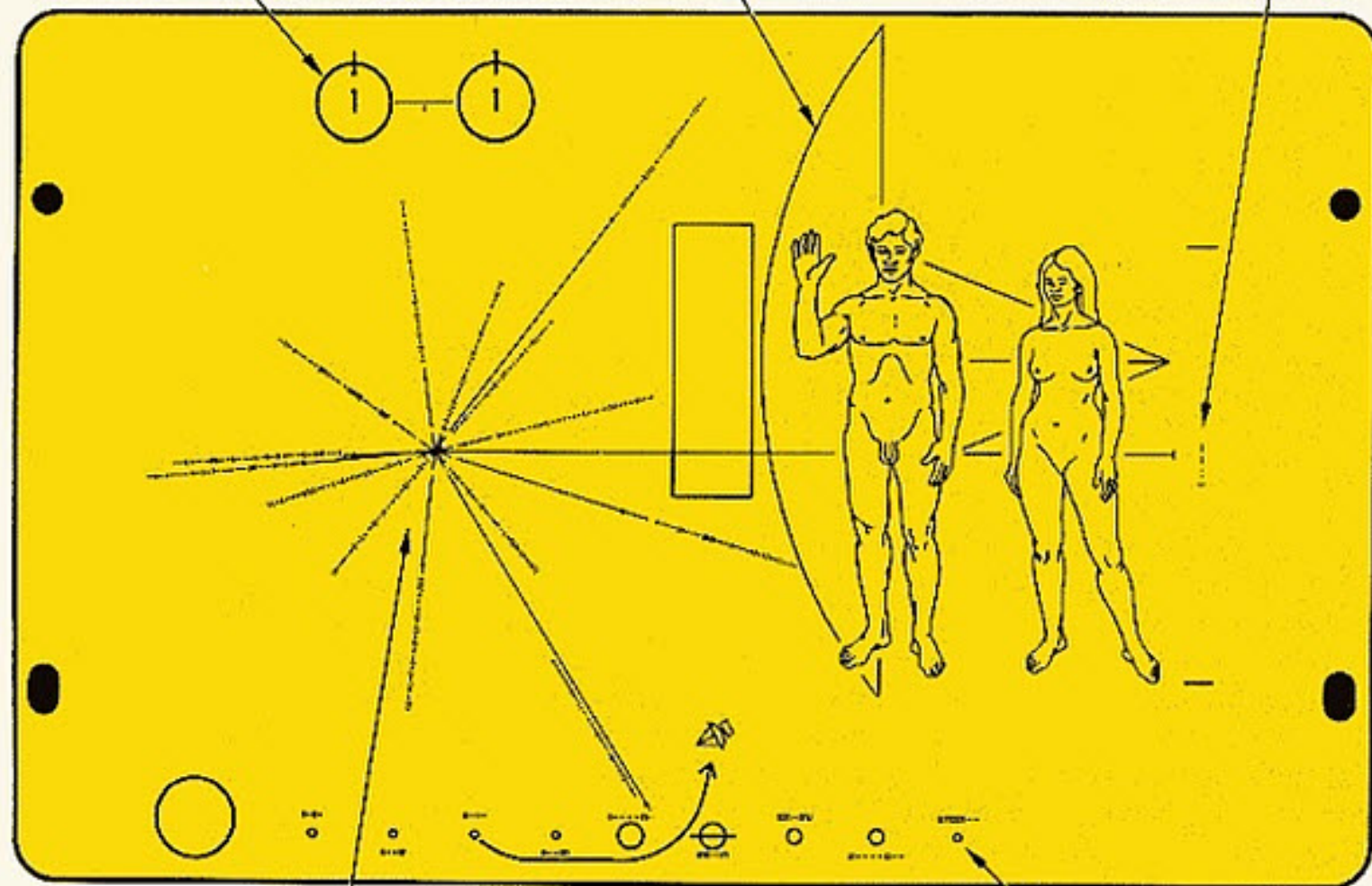
WAS LIFE SPREAD ALL
OVER THE UNIVERSE?



HYPERFINE TRANSITION OF
NEUTRAL HYDROGEN

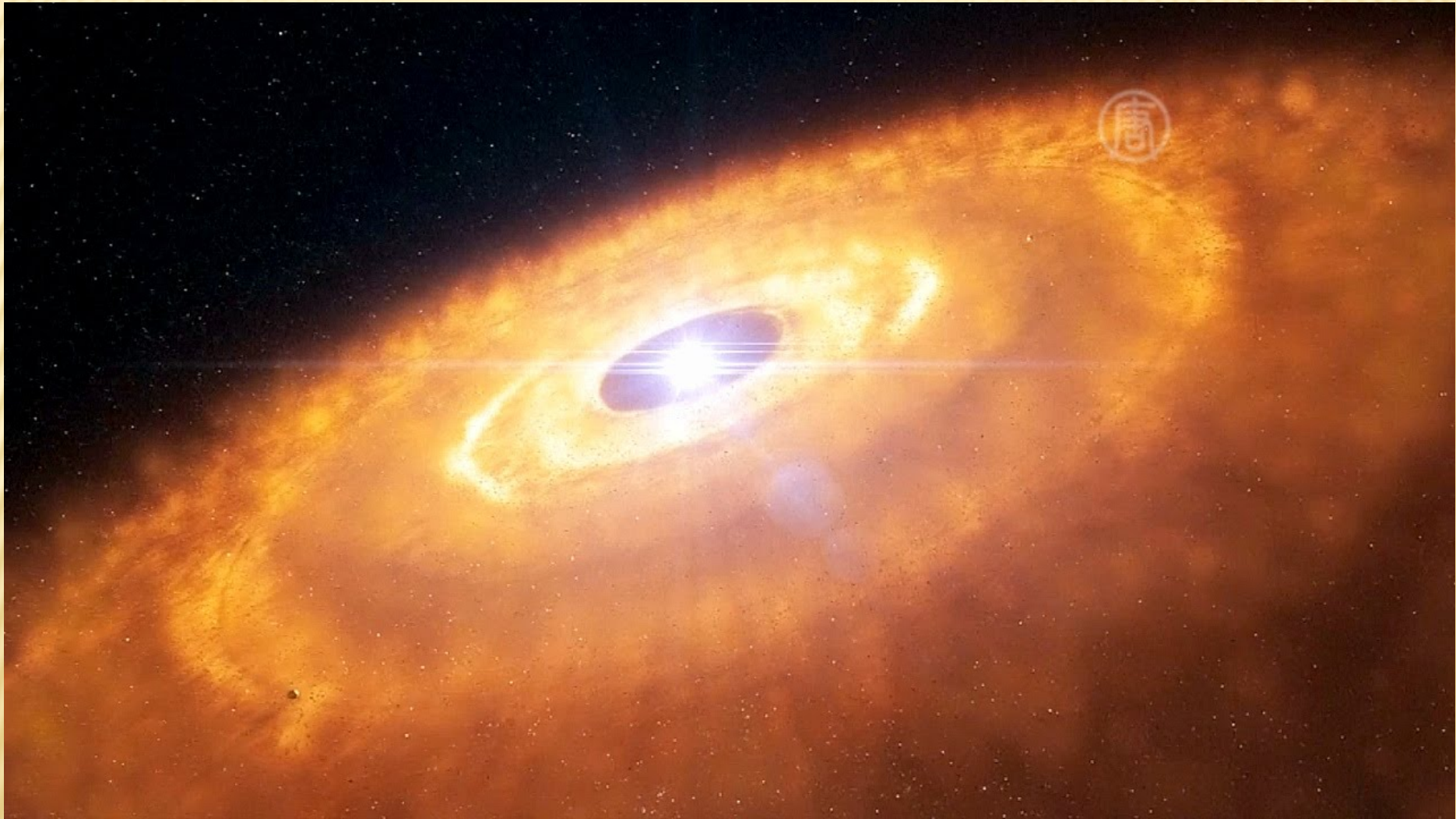
SILHOUETTE OF
SPACECRAFT

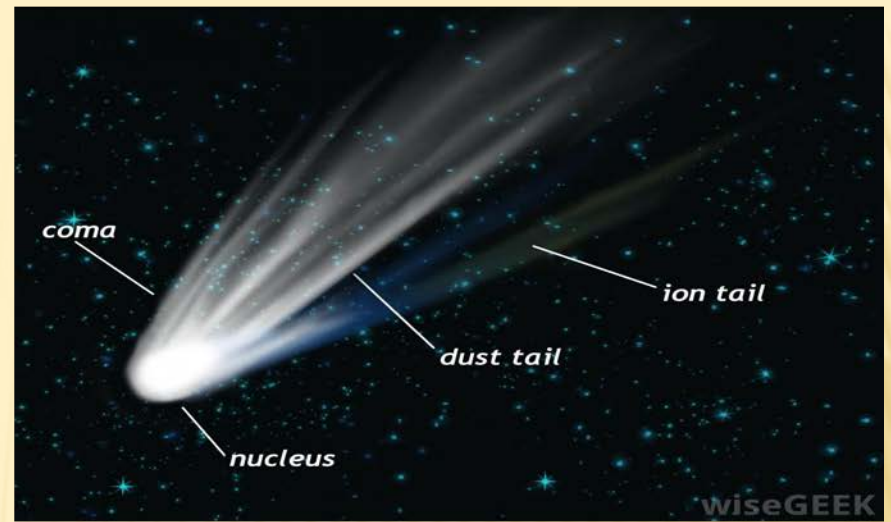
BINARY EQUIVALENT
OF DECIMAL 8



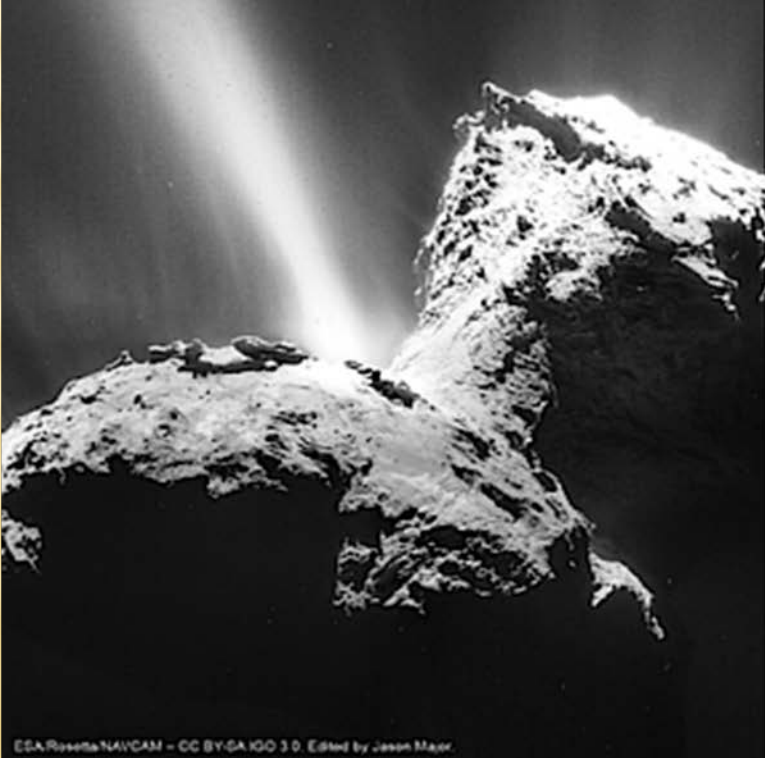
POSITION OF SUN
RELATIVE TO 14
PULSARS AND THE
CENTER OF THE GALAXY

PLANETS OF SOLAR
SYSTEM AND BINARY
RELATIVE DISTANCES





Jan. 31, 2015



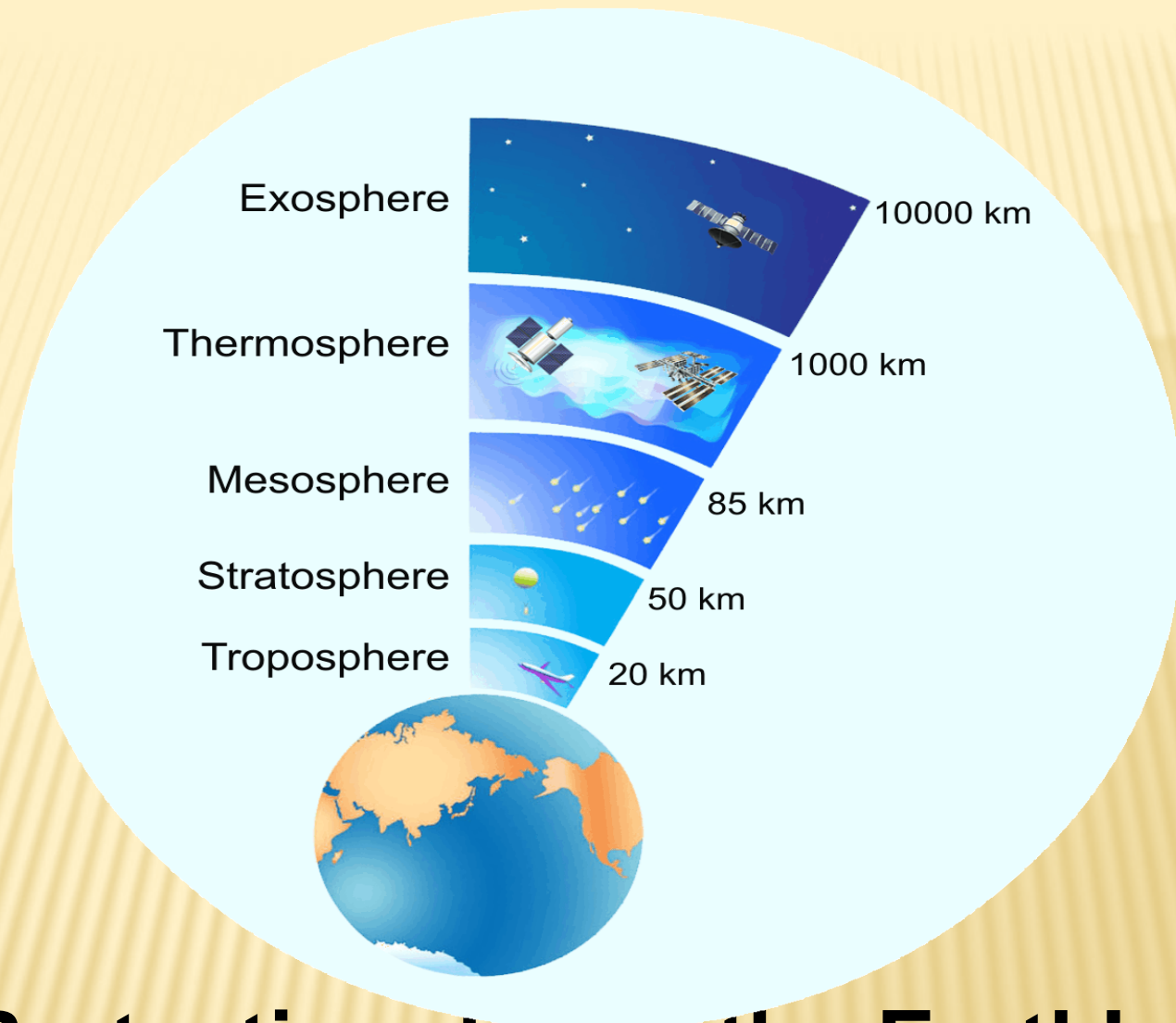
ESA/Rosetta/NAVCAM - CC BY-SA IGO 3.0. Edited by Jason Major.

Feb. 3, 2015

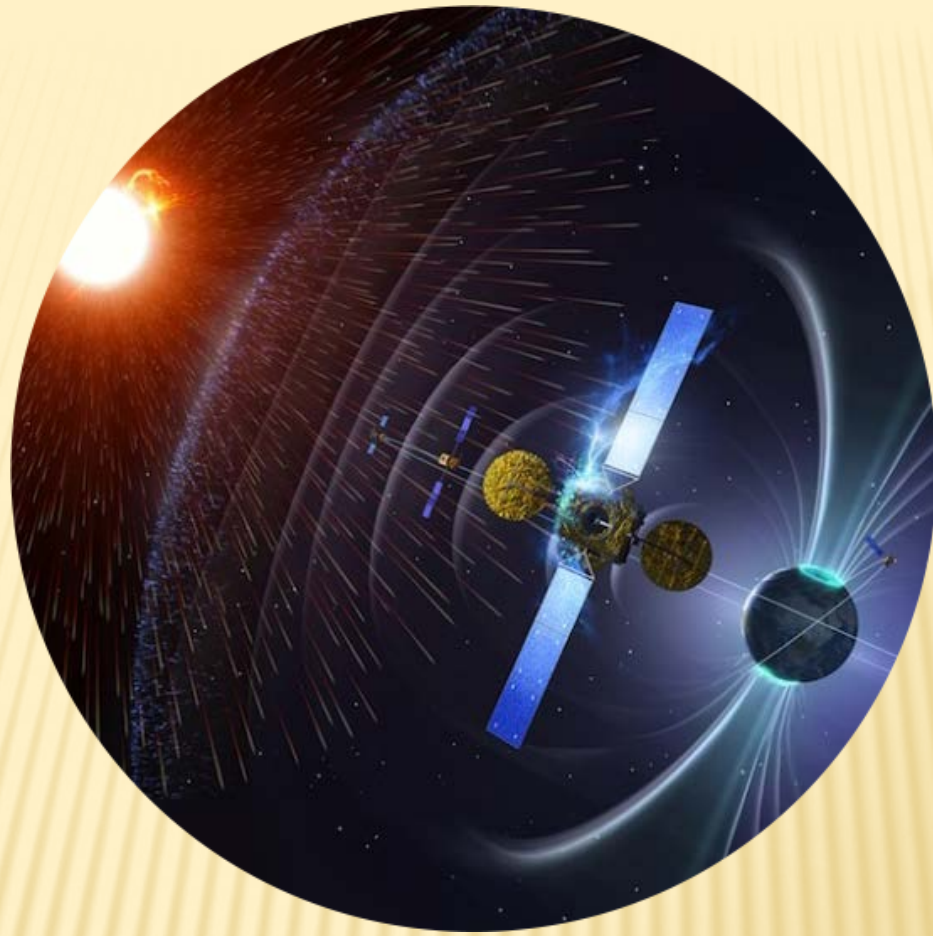




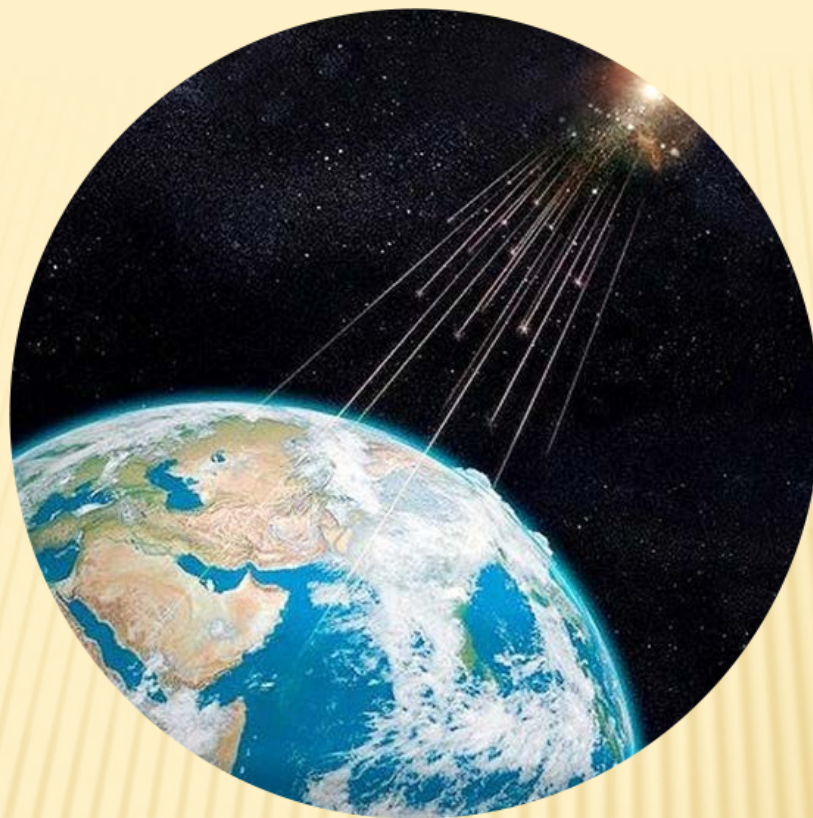
Comet Churyumov-Gerasimenko on the background of Los Angeles. Comet composition is of great interest: water ice, "space debris"; the density of this comet substance is 0.4 g/cm^3 , with a total mass of 10^{13} kg .



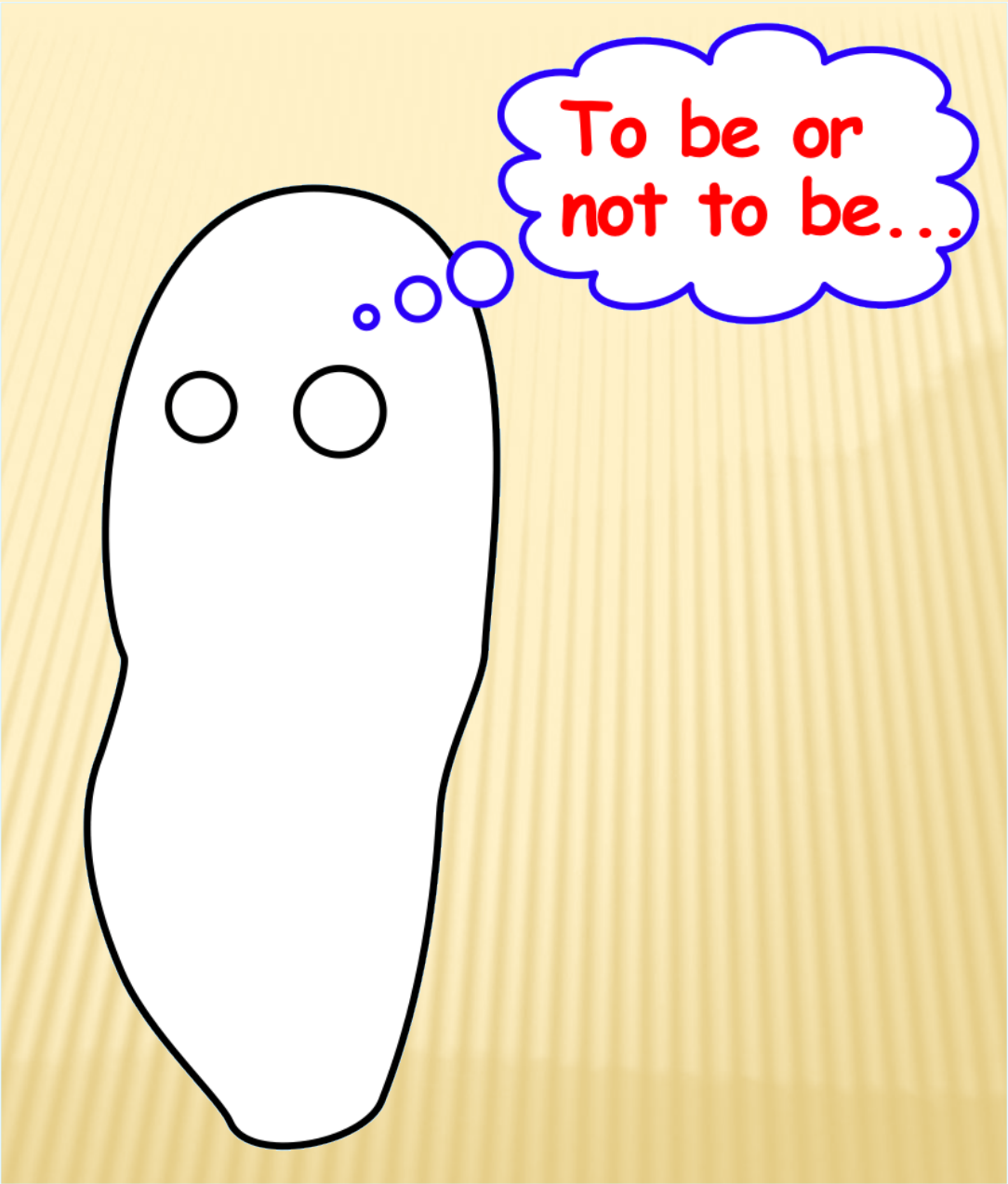
Protection due to the Earth's atmosphere, the exosphere begins at about 1000 km



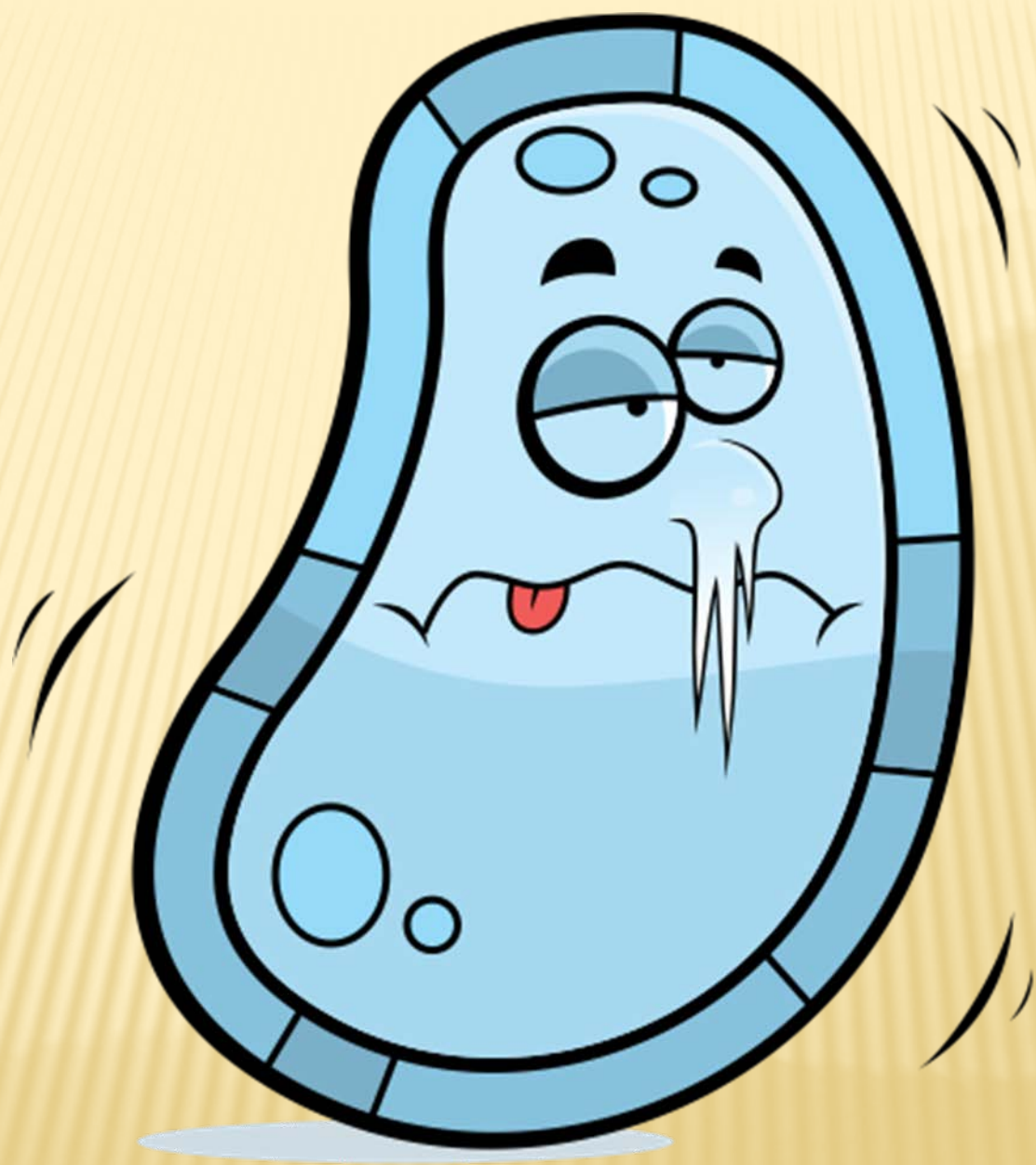
Protection, thanks to the magnetic field of the Earth, which extends according to different data from 60 to 100 thousand km.

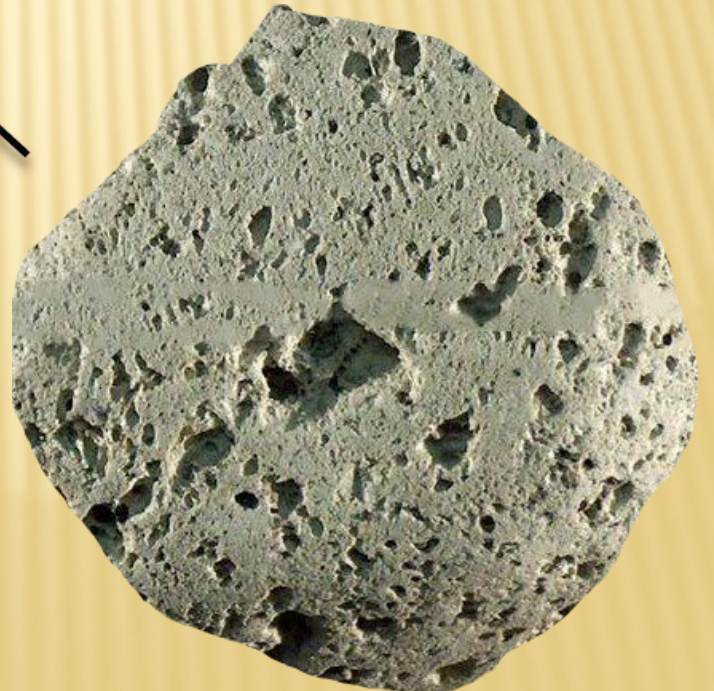
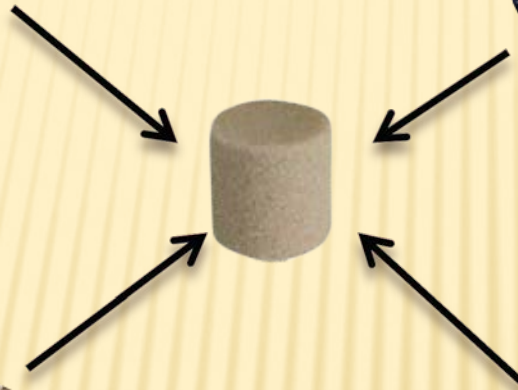


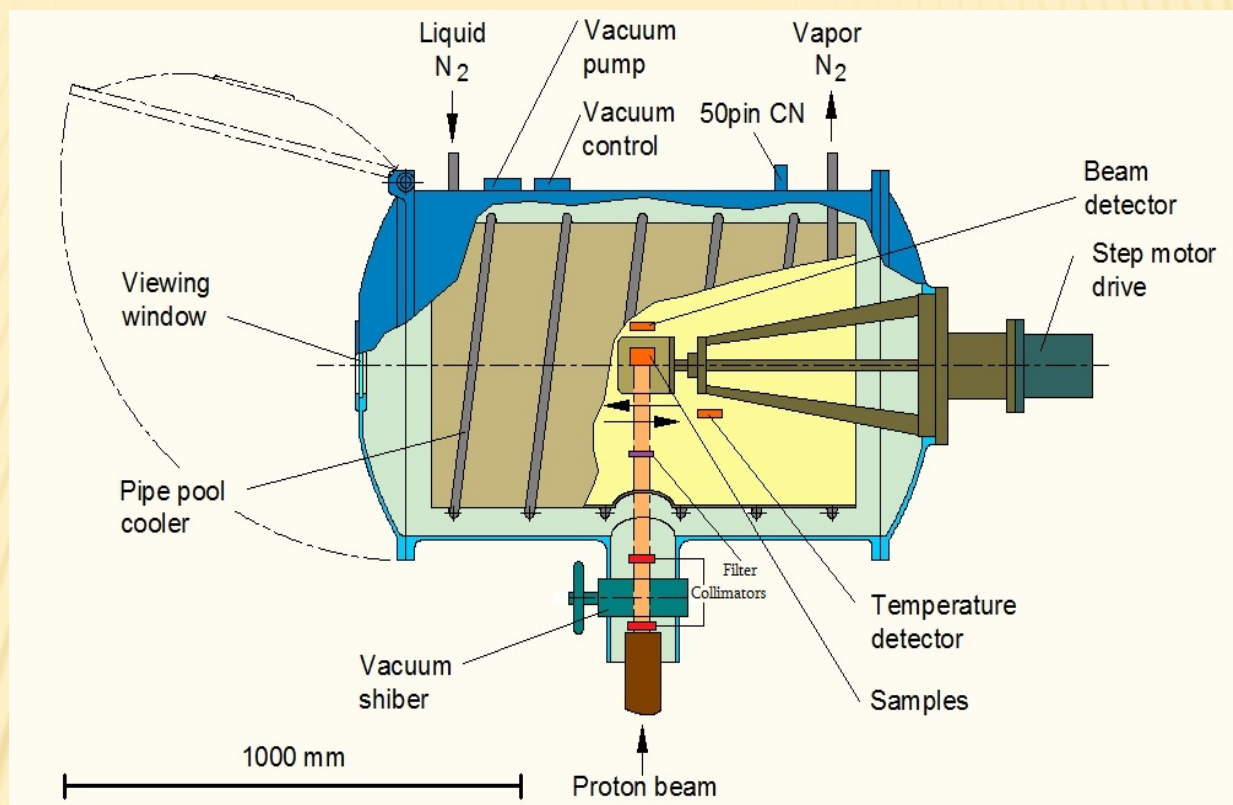
In the interplanetary space, electron and proton fluxes, uranium nuclei with an energy range from tens of eV to 10^{18} - 10^{19} eV, and the linear energy transfer spectrum (LET), determining the nature of the local effect on cells and tissues of bioobjects, from tenths of keV/ μm to $2 \cdot 10^3$ keV/ μm



To be or
not to be...



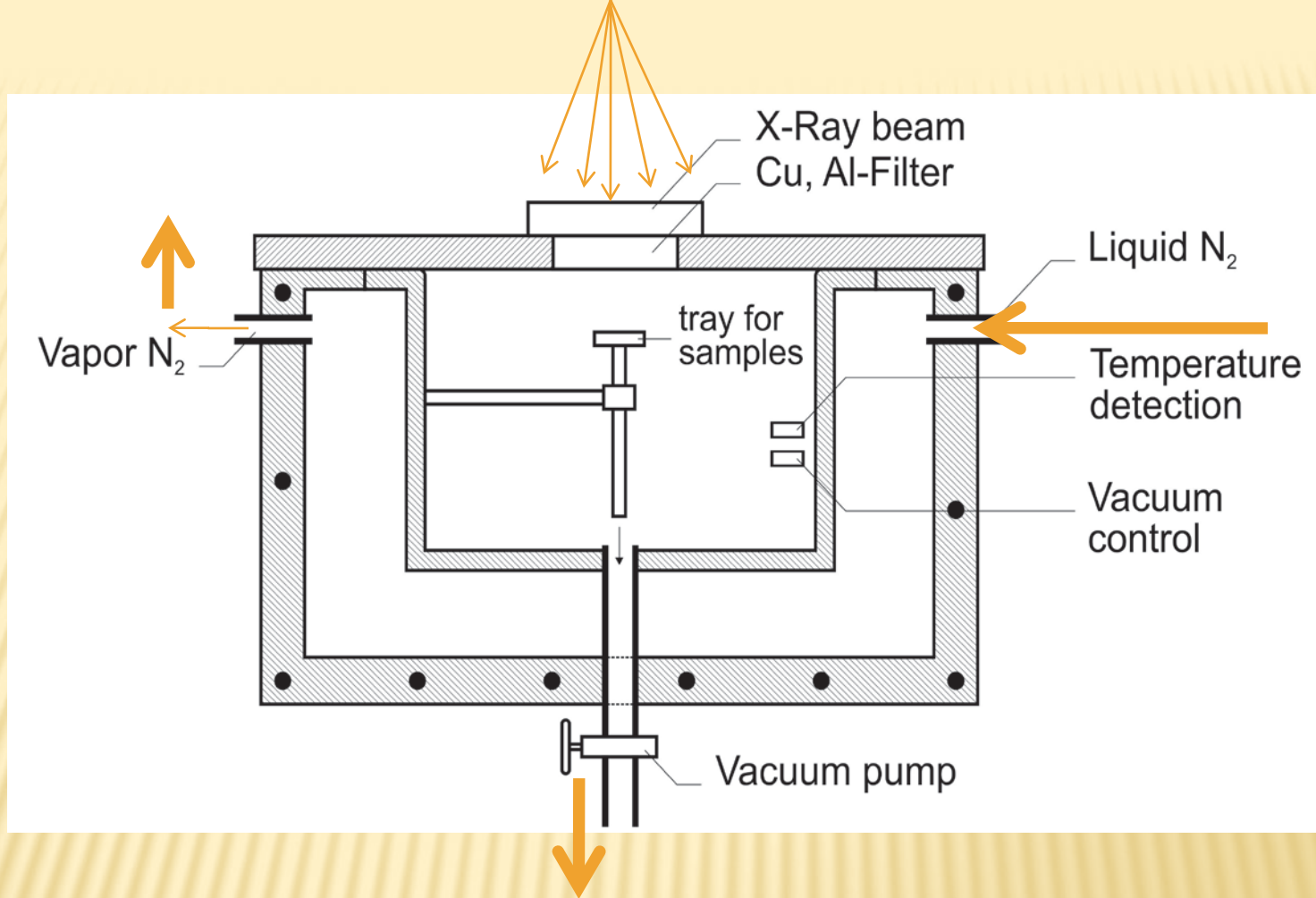




The measuring vacuum chamber and communications scheme, ensuring required parameters' formation (functioning model in [Applied R&D Division](#) of A. I. Alikhanyan National Science Laboratory (Yerevan Physics Institute) (ANL-YerPhi)).



The general view of the radiating head (gantry) of RUM-17



The scheme of top box for sample irradiation (camera-attachment to RUM-17).

THE OBJECTS of INVESTIGATION

Data presented on ICEEMS (Guangzhou, China, 2015)

Proceedings Advances in Energy, Environment and Materials Science – Wang & Zhao (Eds), 2016 Taylor & Francis Group, London, ISBN 978-1-138-02931-6

(DOI:

<http://www.crcnetbase.com/doi/pdf/10.1201/b19635-42>)

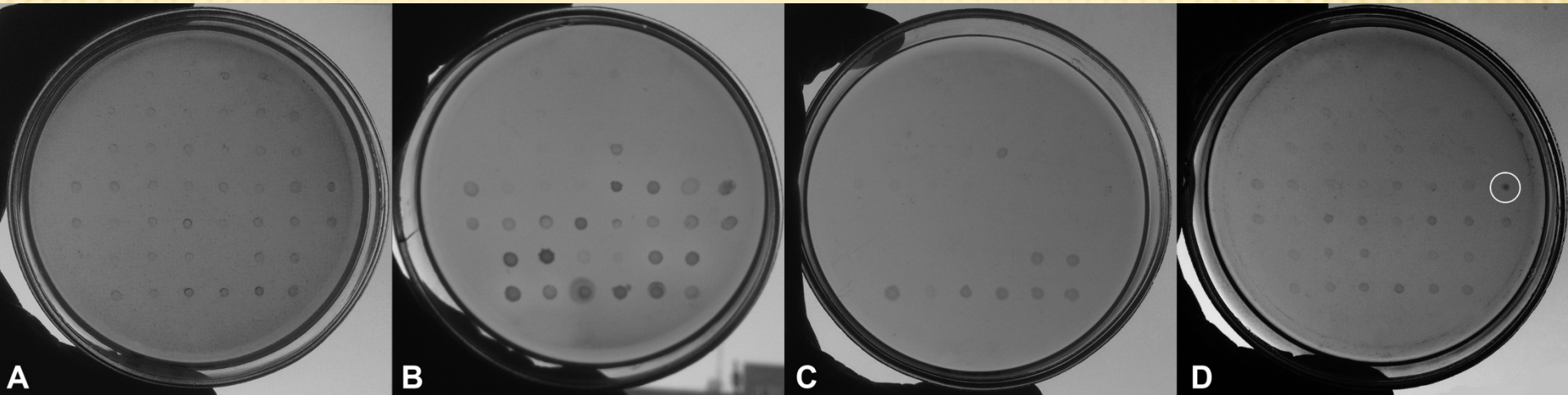


Figure 1.

Growth of the tested cultures of bacteria on the minimal media: A – MM, B – MM+A, C – MM+TL, D – MM+TC.

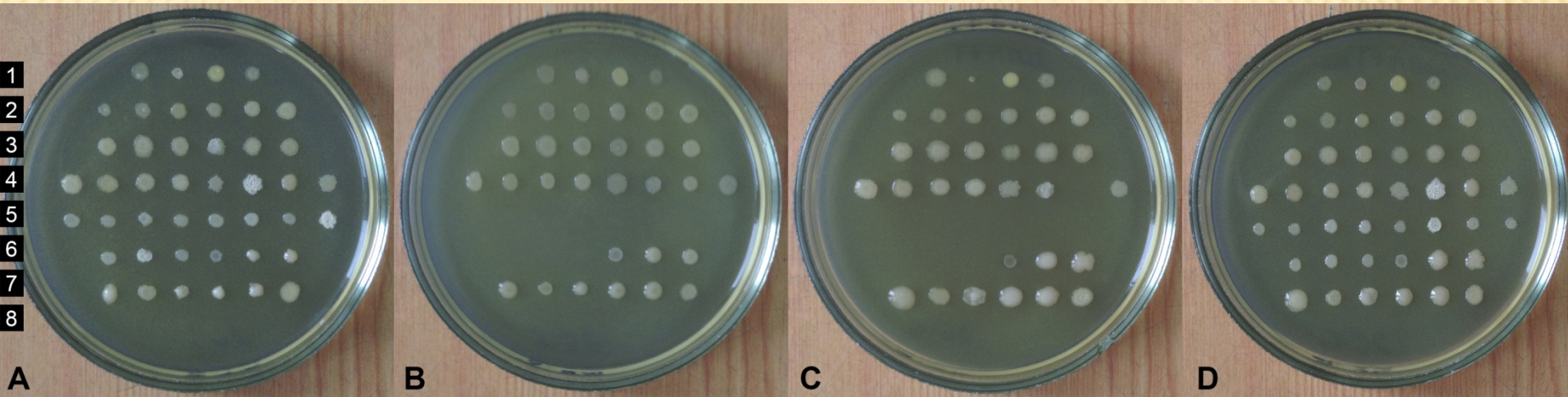


Figure 2.

Growth of the tested cultures of microorganisms on nutrient environments: A – MPA, B – MPA with the actara, C – MPA with the thiamethoxam, purified from actara, D – MPA with the thiamethoxam of firm production. The arrangement of the strains is the same, as on Fugure 1.

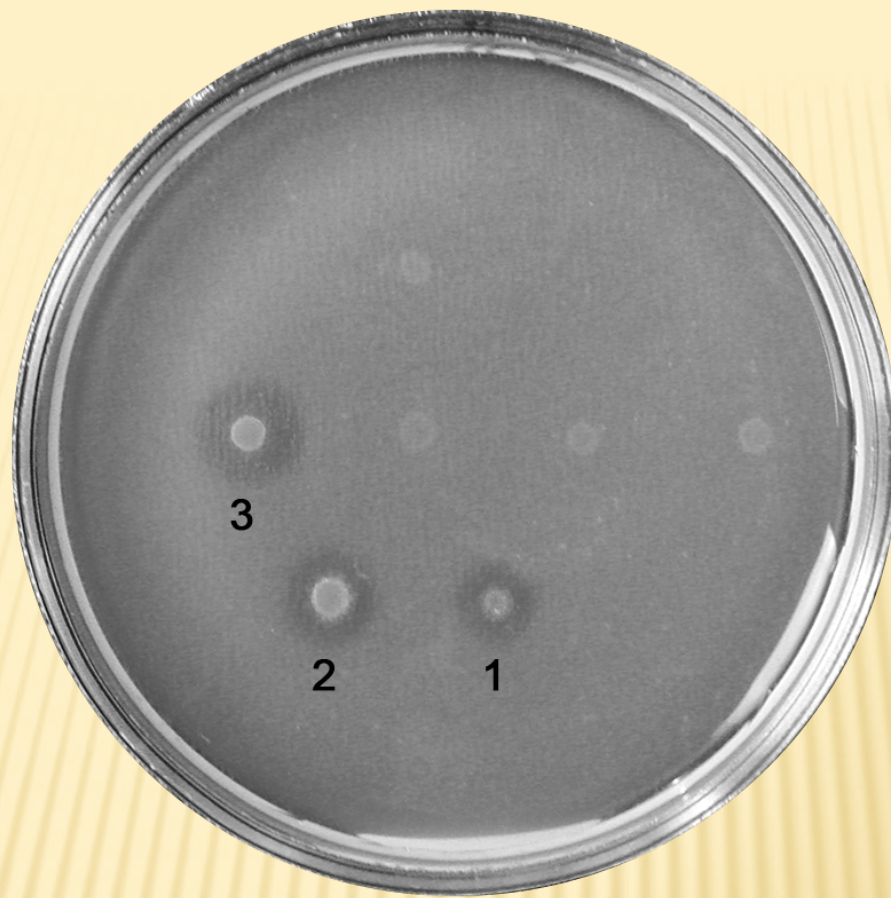


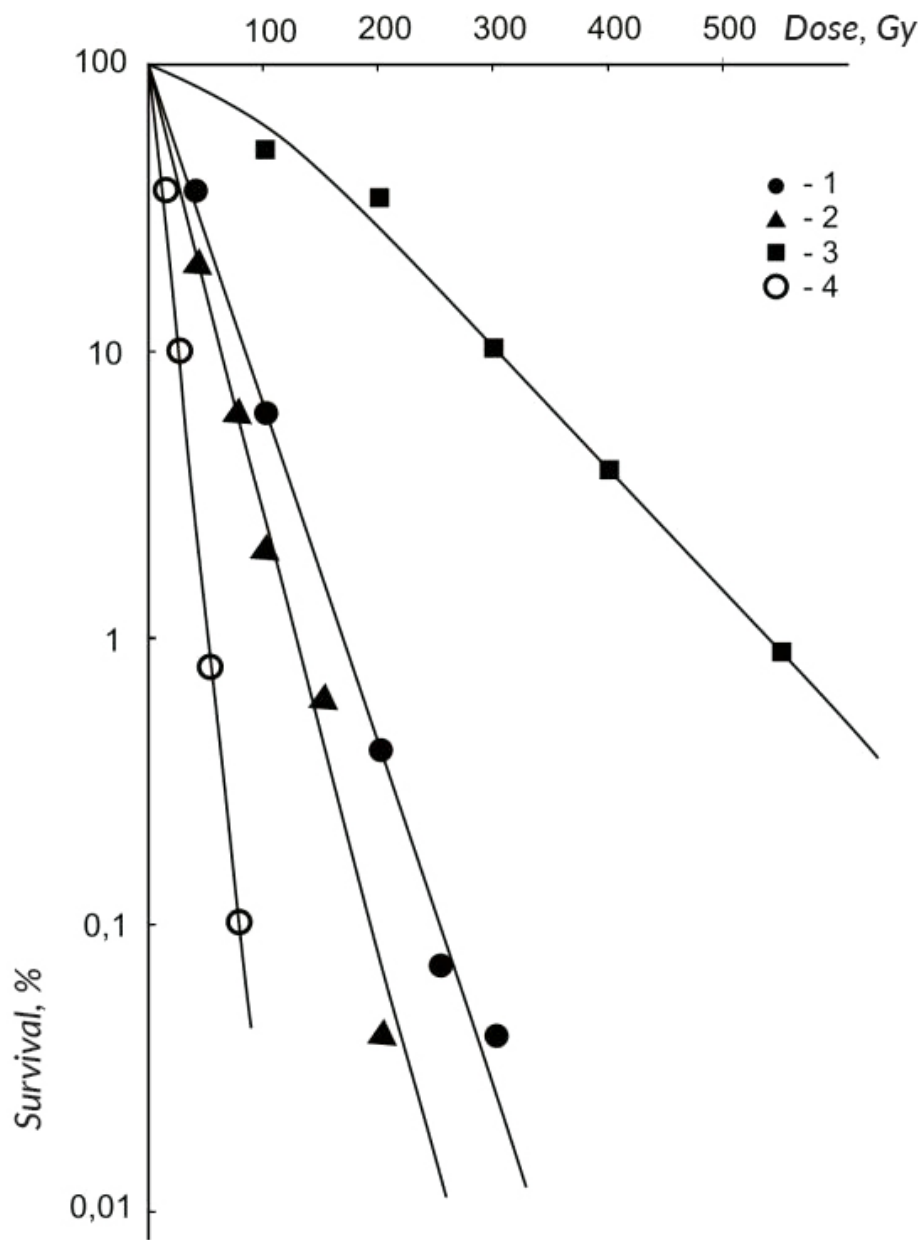
Figure 3.

Formation of halo on MC+A medium. Counter-clockwise from below: 1 – after the first passage; 2 – after two passages; 3 – after three; other plaques – the strains that not forming halo.

The Examples of Expected results similar to earlier performed works, such as:

Avakyan Ts.M., Mkrtchyan N.I., Simonyan N.V., Khachatryan G.E. The Research of Biological Action of the Electrons with the Energy of 7.5 MeV on the Cells of E. Coli K-12 Bacteria Having Different Reparation Genotype, *The Report of NAS of Armenia*, v.111, No 2, pp. 164-170, 2011
(http://elib.sci.am/2011_2/08_2_2011.pdf)

Khachatryan G. E., Arakelyan V. B., Simonyan N. V., Mkrtchyan N. I., Avakyan Ts. M., Pyuskyulyan K. I. Some Aspects of Radioecology in the Areas Adjacent to Armenian NPP, **in the book** «*Genetics, Evolution and Radiation*», pp. 315-328, **2017**. Springer, ISBN 978-3-319-48837-0, DOI 10.1007/978-3-319-48838-7



Survival curves of the cells of bacteria *E. coli* K-12 different strains irradiated with electrons of 7.5 MeV:

Strain *AB-1157* - usual irradiation conditions (1),

Strain *AB-1157* - 2 hours preliminary exposure in physiological saline (2),

Radioresistant strain *BL-1114* (3),

Radiosensitive strain *AB-2463* (4) .

The samples of dose response curves for different kinds id bacteri

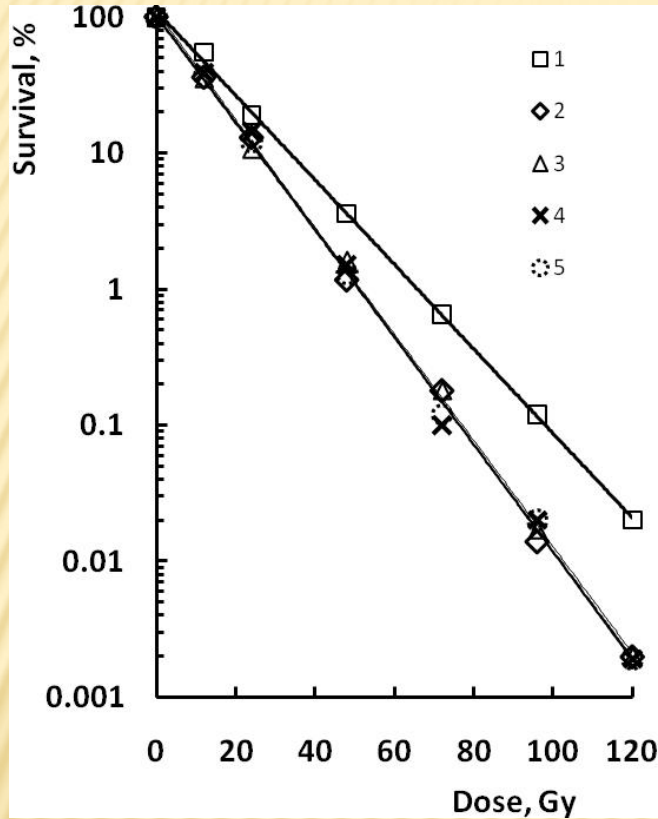


Fig.1.
Dose-response curves for radiosensitive cells of bacteria *P. fluorescens*

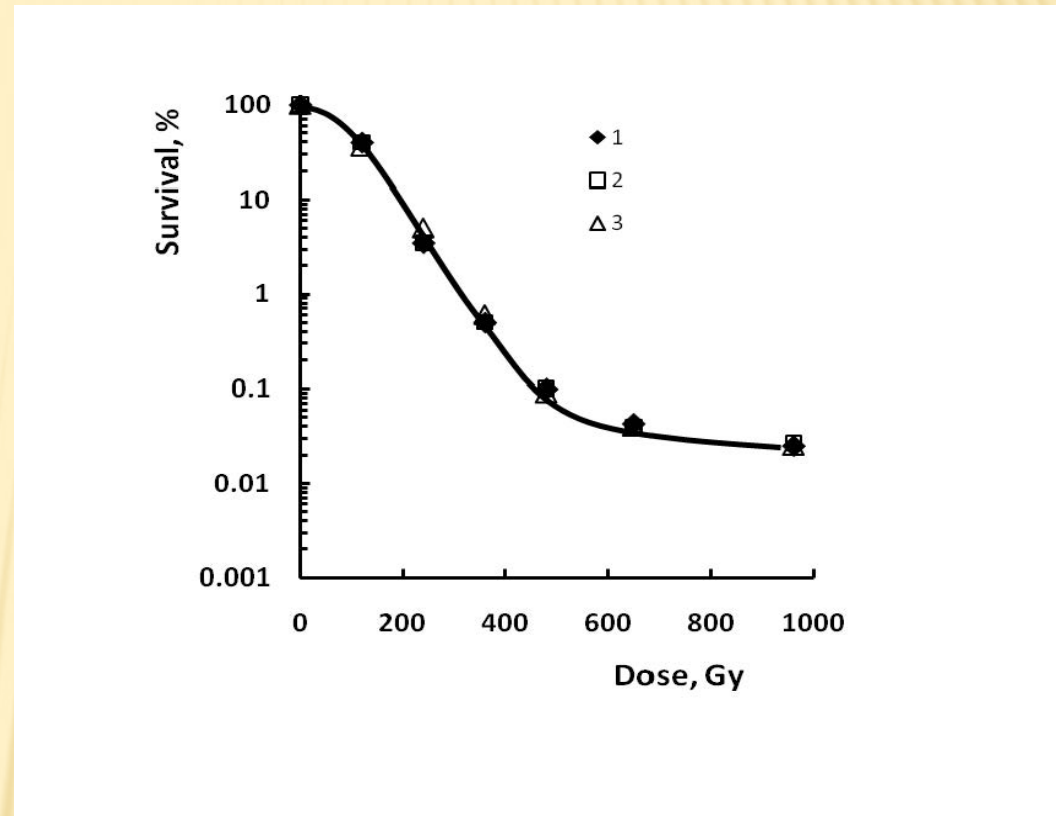
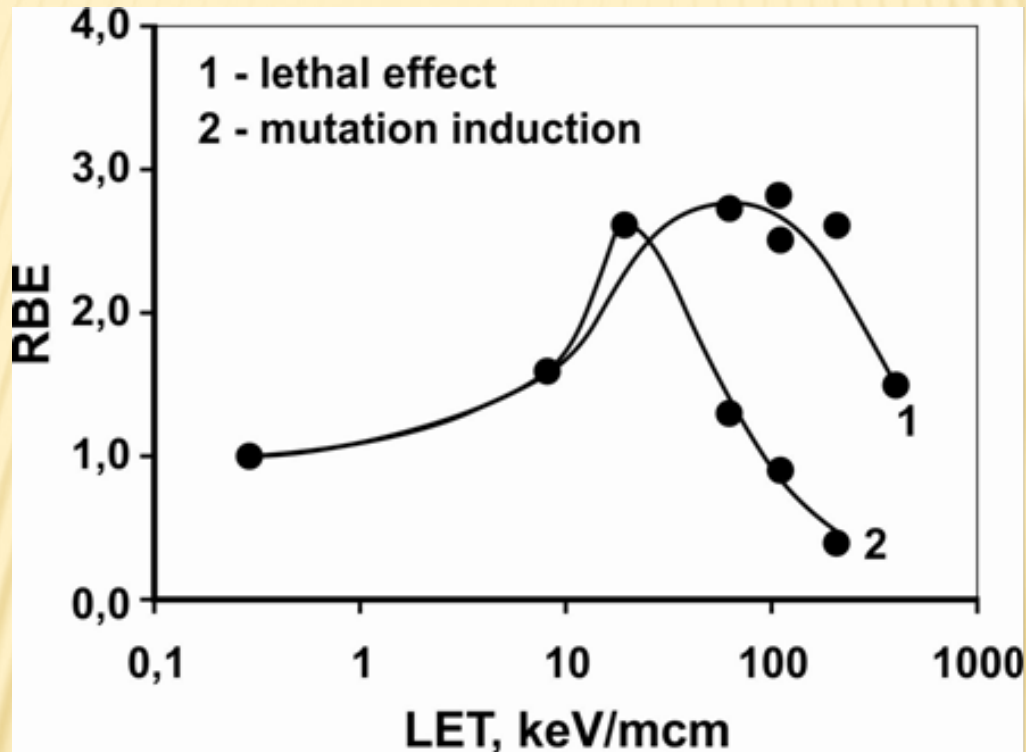


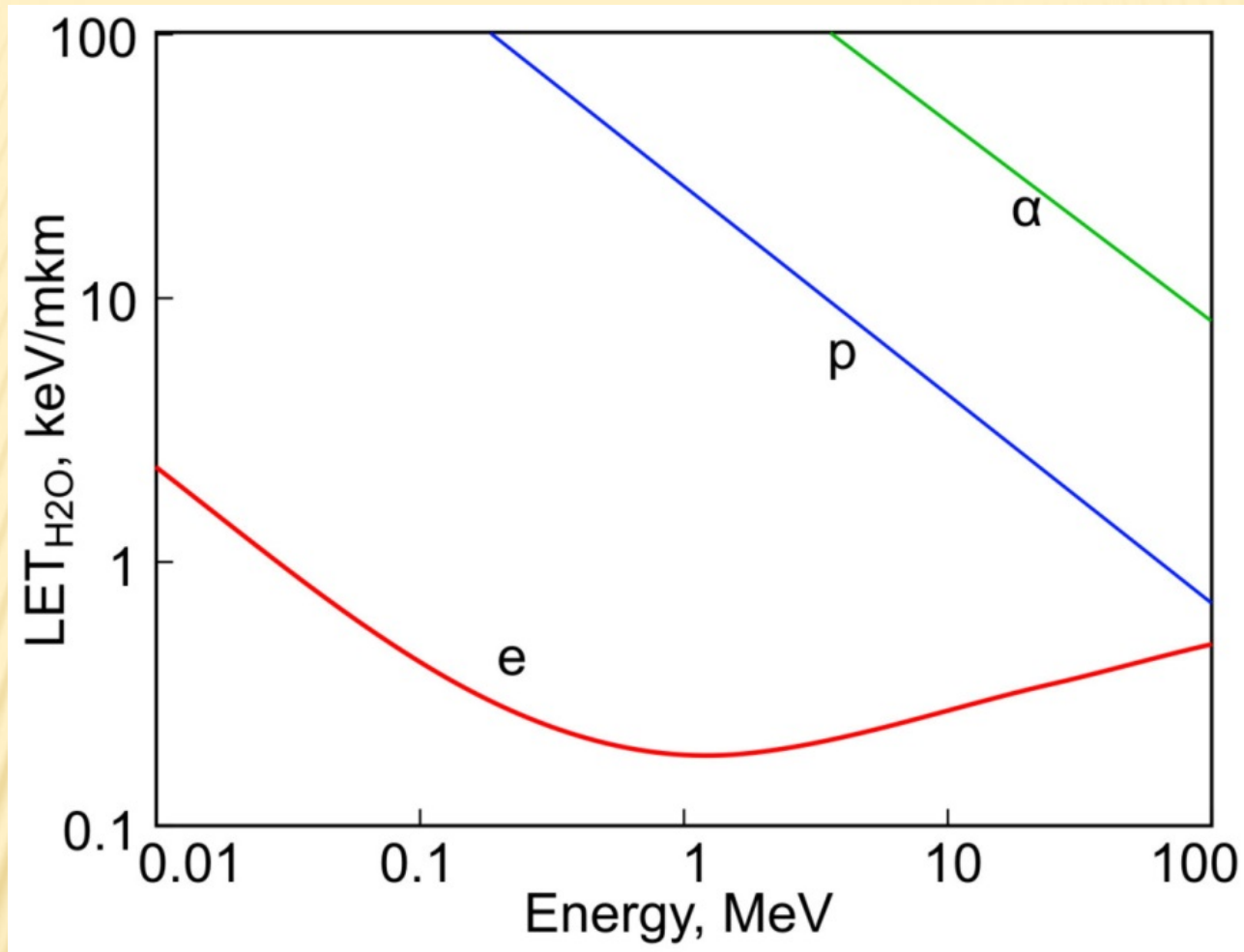
Fig.2.
Dose-response curves for radioresistance cells of bacteria *Bacillus subtilis*

The possibility of obtaining mutants.

The graphs of the yield of mutants and the lethal effect on the beams of accelerated ions (Krasavin EA, Dubna).



Dependence of RBE on LET of particles based on the criterion of Lac⁻ mutations induction and the lethal effect for bacteria *E. coli*.



Dependence of LET from Energy for different particles in water medium

Publications 2010-2015

Tatikyan S.Sh., Mkrtchyan N.I., Simonyan N.V., Khachatryan G.E. Biodegradation of triazine herbicides, *Biol. J. Armenia*, 62(1):36 - 42, **2010**.

Avakyan Ts.M., Mkrtchyan N.I., Simonyan N.V., Kachatryan G.E. The Research of Biological Action of the Electrons with the Energy of 7.5 MeV on the Cells of E. Coli K-12 Bacteria Having Different Reparation Genotype, *The Report of NAS of Armenia*, v.111, No 2, pp. 164-170, **2011**.

Mkrtchyan N.I., G.E. Kachatryan, S.S. Tatikyan, Simonyan N.V. The growth of some soil aerobic bacteria in the presence of insecticides Actara and Confidor, *Biol. J. of Armenia*, 63(3):6-14, **2011**.

Н.В. Симонян, Н.И. Мкртчян, Т.Е. Сеферян, Г.Э. Хачатрян, Ц.М.Авакян Летальное действие ионизирующих излучений, различающихся по величине линейной передачи энергии (ЛПЭ) на клетки бактерий Escherichia coli K-12 разного репарационного генотипа, **Труды** Третьей Международной конференции “Современные проблемы генетики, радиобиологии, радиоэкологии и эволюции”, посвященной Н.В. Тимофееву-Рессовскому, Третьи Чтения памяти В.И.Корогодина и В.А.Шевченко, по научной программе НАТО, т.1, стр. 314-321, Дубна, 2012 г.

Khachatryan G.E., Mkrtchyan N.I., Simonyan N.V., Arakelyan V.B., Avakyan Ts.M., Pyuskyulyan K.I., Atoyany A.V. Reaction of the Soil Microbiota on the Influence of Armenian Nuclear Power Plant, *Biol. J. Armenia*, 66 (2), pp. 68-74, **2014**.

Khachatryan G. E., Mkrtchyan N. I., Tatikyan S. Sh., Ghavalyan V. B., The Nature of Halo Forming on the Agar Plates Containing Actara During the Growth of Some Aerobic Bacteria, Abstracts, Second Intern. Confer.: “Contribution of the young generation in the development of biotechnology”, Yerevan, Oct.1-4, 2013, p. 192.

Khachatryan G.E., Mkrtchyan N.I., Simonyan N.V., Arakelyan V.B., Avakyan Ts.M., Pyuskyulyan K.I., Atoyan A.V. Reaction of the Soil Microbiota on the Influence of Armenian Nuclear Power Plant, Biol. J. Armenia, 66 (2), pp. 68-74, 2014.

Khachatryan G.E., Mkrtchyan N.I., Simonyan N.V., Arakelyan V.B., The content and radiosensitivity of the bacteria of *Pseudomonas* and *Bacillus* genera in soil samples from the sites adjacent to Armenian nuclear power plant, Biol. J. Armenia, 66 (3), стр. 6-13, **2014** г, ISSN 0366-5119, <http://biology.asj-oa.am/11131/>

Khachatryan G. E., Mkrtchyan N. I., Pesticide usage and environmental protection, *Proceedings of International Conference on Energy Environment and Material Science, Guangzhou, China, 25-26 July, 2015 (in press).*

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СПАСИБО!

THANKS!