ALMAR Dosimeter for Space Application

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ALMAR Active Dosimeter specifications

- High Stability in pulsed radiation fields
- Lower detectable limit 0,6 µSv
- Linearity up to 10 Sv
- Measure the different types of radiation.
- calibrated (Los Alamos, HIMAC,)
- Dose rate and angular dependence < 5%
- No Electromagnetic interference
- Very low power consumption/ Long battery lifetime/rechargeable
- Compact Size and weight
- Selection of the alarm levels
- software/ no need for installation
- User friendly

CE

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ALMAR characteristics

Power consumption
Active mode typical current: 5mA
Stand-by mode typical current: below of 0.5 µA

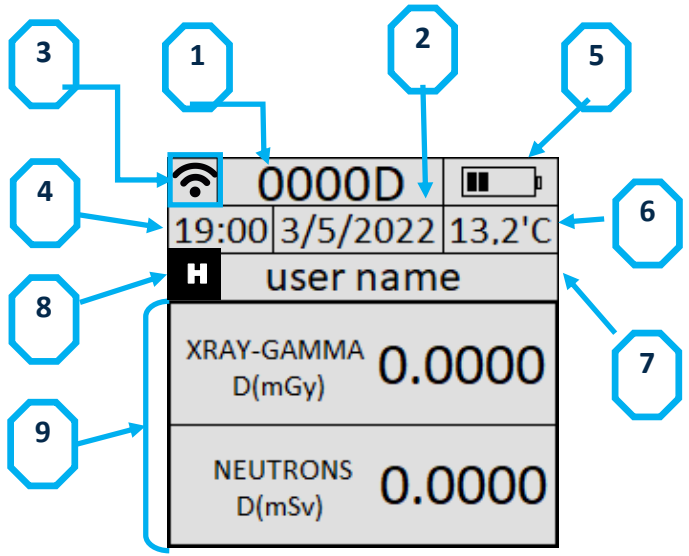
Measurement of protons and neutrons

The battery may last for more than 3 months

Dimensions
Compact size & weight

Weight: 25 gr
Length: 65 mm
Width: 15 mm
Height: 48 mm

WiFi and USB connectivity



1. .Unique Device ID
2. .Date
3. .WiFi ON indicator
4. .Time
5. .Battery level indicator
6. .Temperature
7. .User name
8. Mode H
9. .Measurement Area

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HERADO Monitoring Platform (HRDS)

On top of **active radiation dosimeter ALMAR**, we have developed a **cloud radiation data management platform (HRDS**).

HRDS provides **organizations** with an **instant overview** of **radiation potential safety issues**. It also allows the users to **analyze in real-time** the data and produce reports and statistics for their **organizations** and **government institutions**.

Automatic transmission of **radiation data** and a **complete radiation monitoring program** that can send **data** to the **National Dose Registry** using **AI-** and **cloud-** based technologies.

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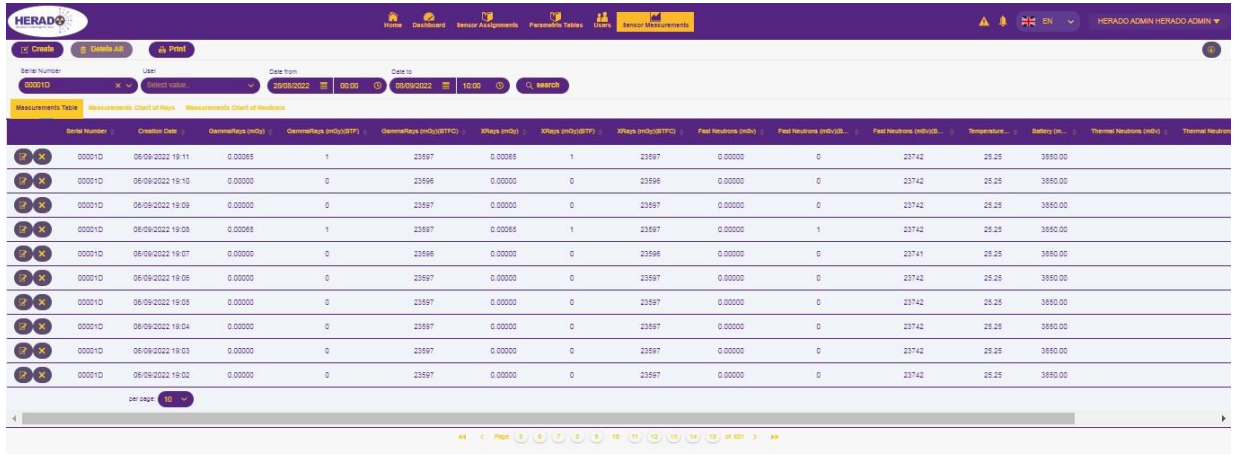
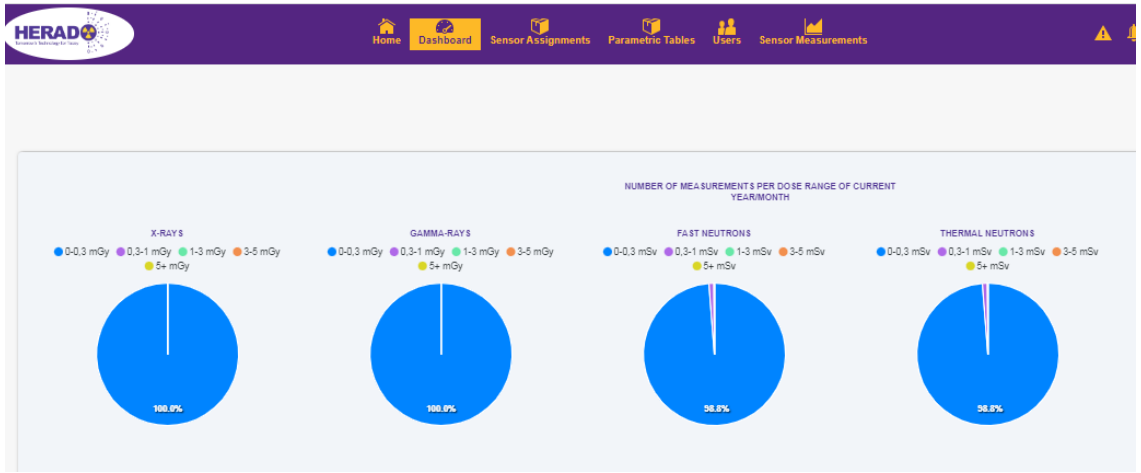
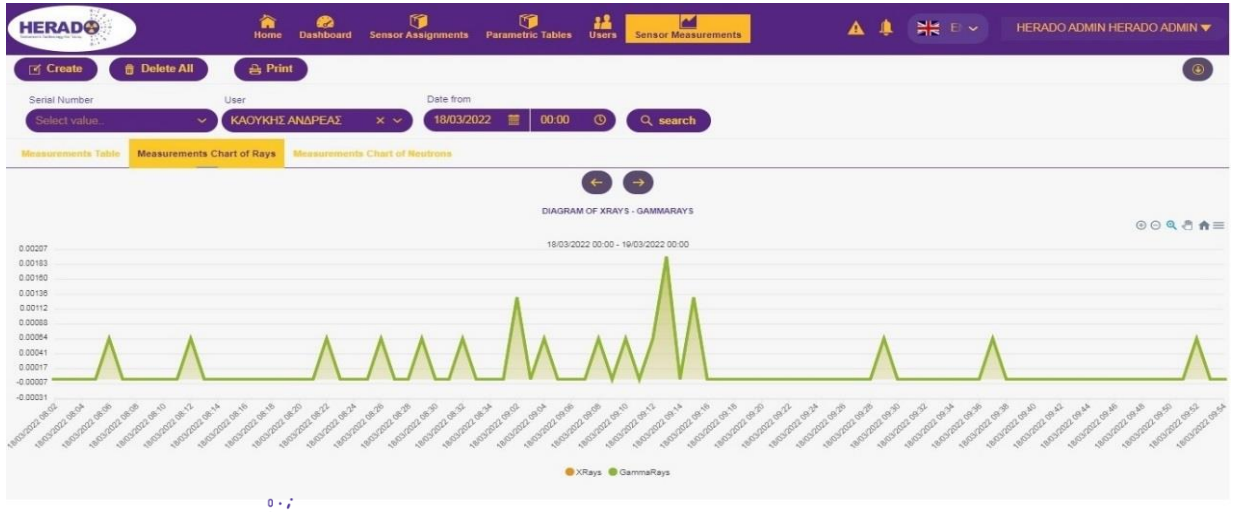
HERADO Monitoring Platform (HRDS)







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ALMAR test and measurements reports

ALMAR is **fully licensed CE** (EN 61526) and **accredited, meets ICRU 95 recommendations**.

Conforms with the following Harmonized standards:

EMC: EN 55032, Class B :2015+A11:2020
EN 55011, Class B/Group 1:2016+A11:2020
EN 61326-1:2020
RED: ETSI EN 300 328 V2.1.1(2016-11)
RoHS: EN 50581:2012
HUMAN EXPOSURE: EN 62311:2008

Photo 8.1: Setup for radiated emissions test (30MHz-1GHz)

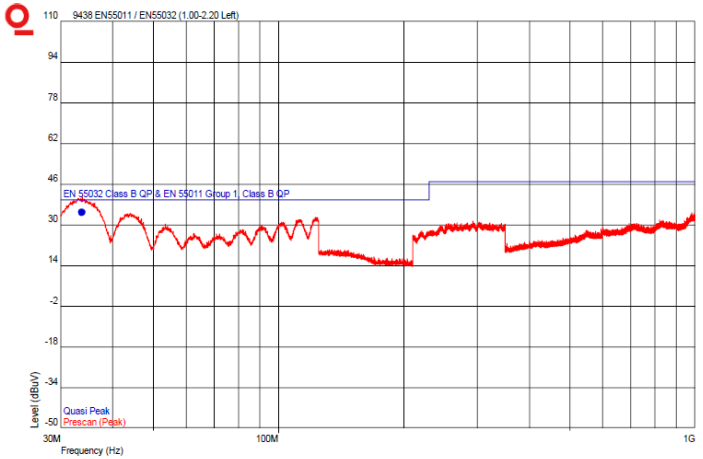

Fig. 8.3: Results for left side (90˚), frequency range: 30MHz-1GHz.

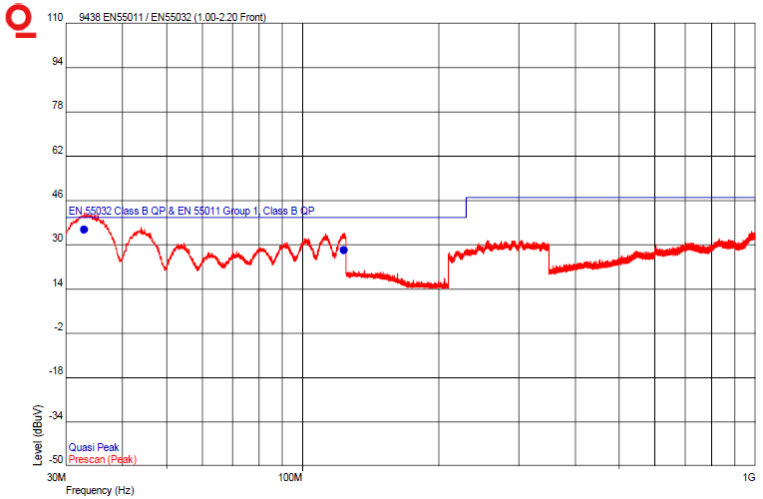

Fig. 8.2: Results for front side (0˚), frequency range: 30MHz-1GHz.

Pilots results from hospitals in comparison with Passive and other PED

Results from running Pilots

	ALMAR	Passive (TLD)	APDs
Full month comparison at **nuclear medicine** department	(0,13 ± 0,01) mGy	0,14 mGy	
Full month comparison at **cardiovascular department**	(1,85 ± 0,013) mGy	1,9 mGy	
APD in nuclear waste storage room (+/- 3 days), dose rate at start = 12-17 µSv/h)	0,108 ± 0,011 mGy		0,1385 mGy

azdelta Uw ziekenhuis.

The biggest hospital in Weat Flanders, Belgium

Oklahoma State University Hospital US

METROPOLITAN HOSPITAL

The biggest hospital group (CVC Capital Partners) in Greece

ΓΕΝΙΚΟ ΝΟΣΟΚΟΜΕΙΟ ΑΘΗΝΩΝ ΓΕΝΝΗΜΑΤΑΣ

The biggest Goverment hospital in Greece

EEAE

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GREEK ATOMIC ENERGY COMMISSION

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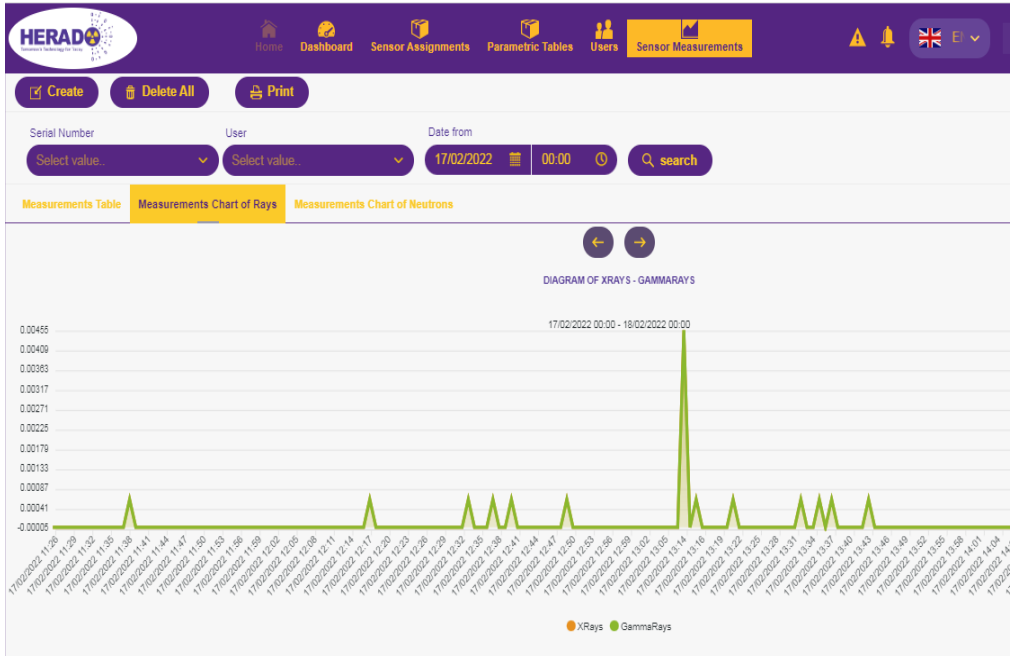
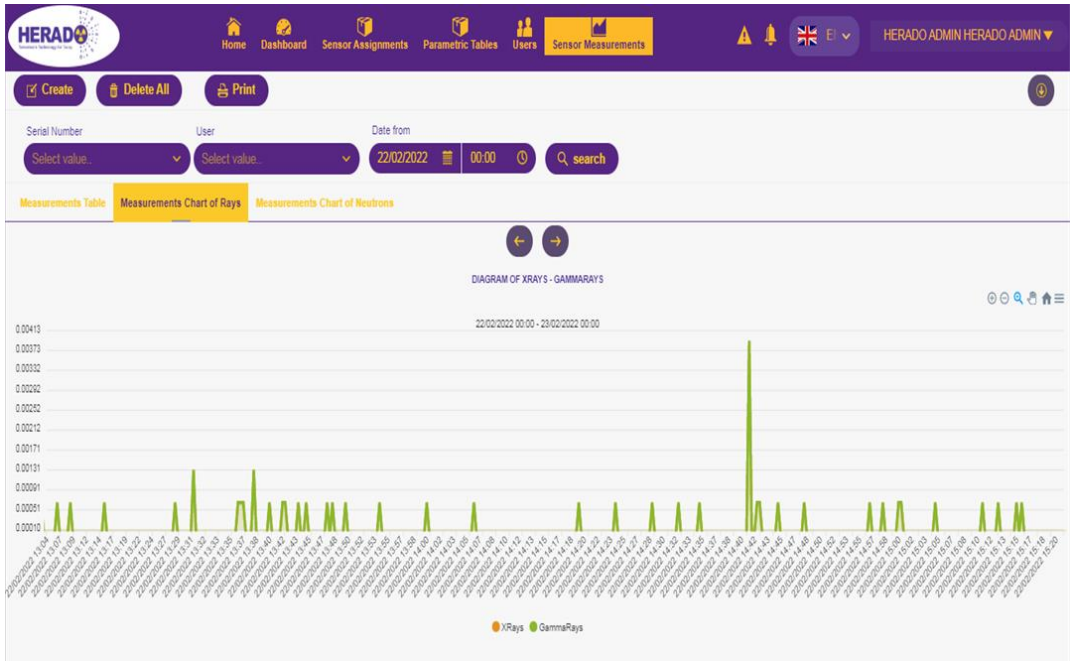
Pilots results from hospitals in collaboration with Greek Atomic energy





Figures. *pilot result in different gamma rays fields*

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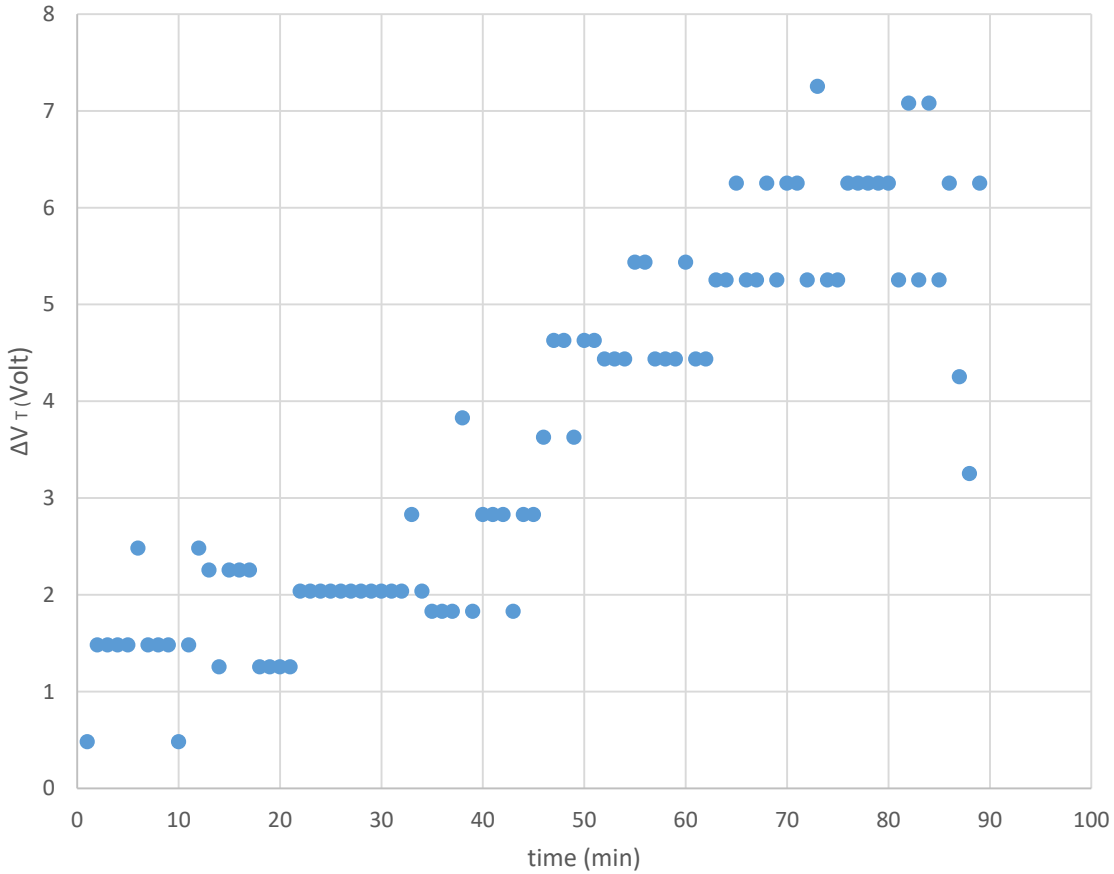
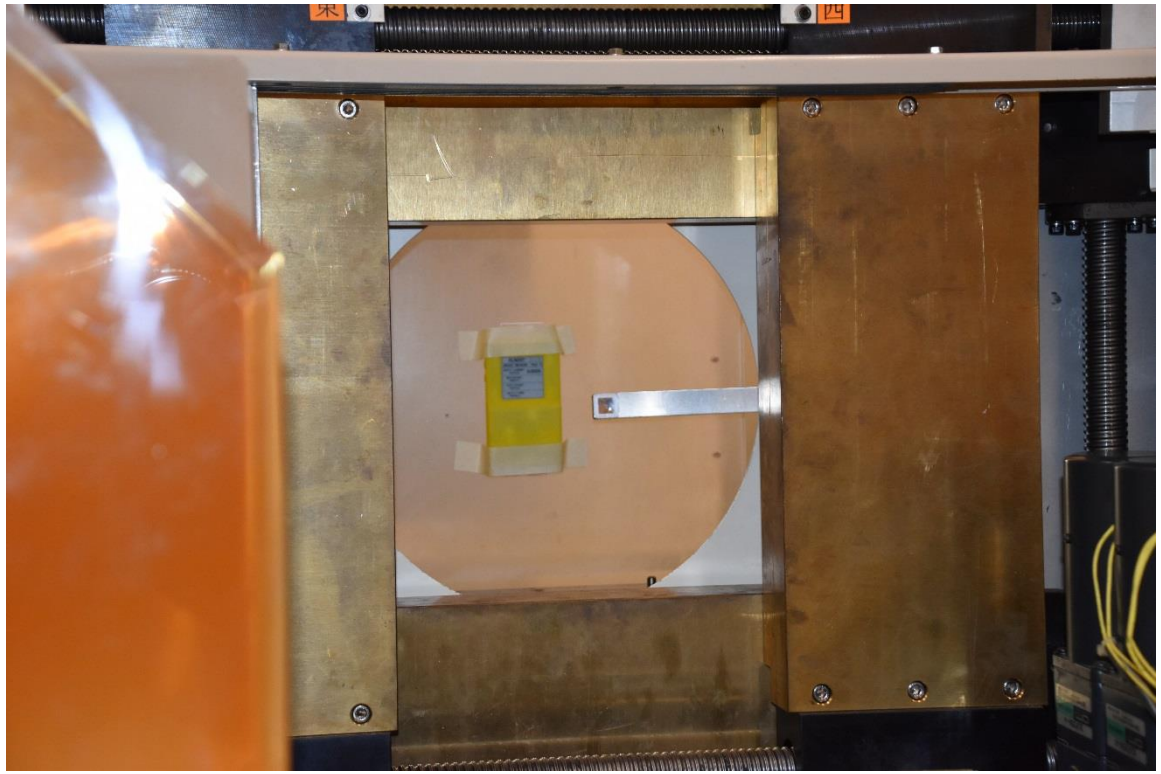
Irradiation at 150 MeV/n He (Los Alamos)





The detector in the beam line with the 1 cm^-2 plastic scintillator, for beam monitoring.

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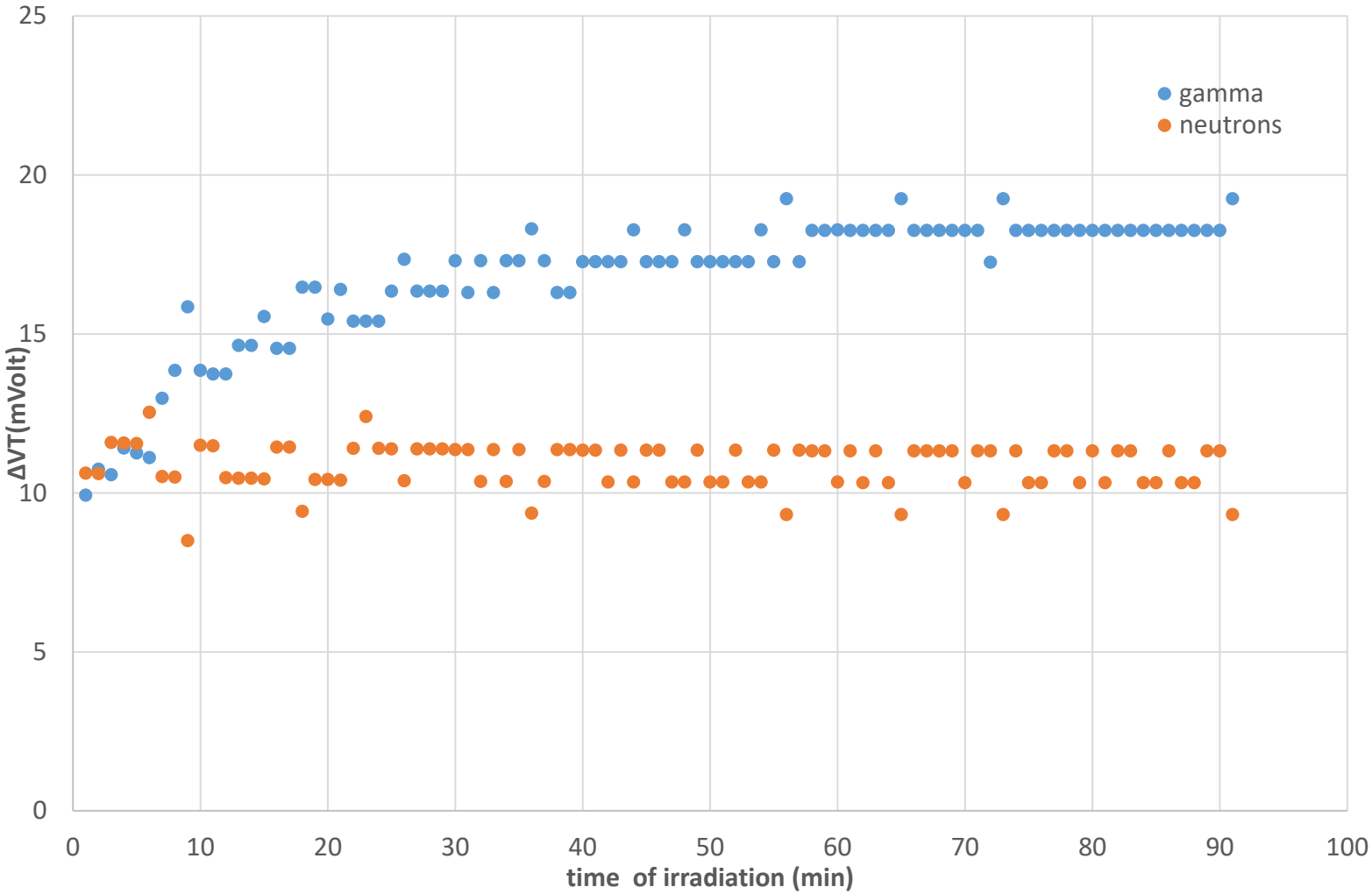
Irradiation at Los Alamos LANSCE



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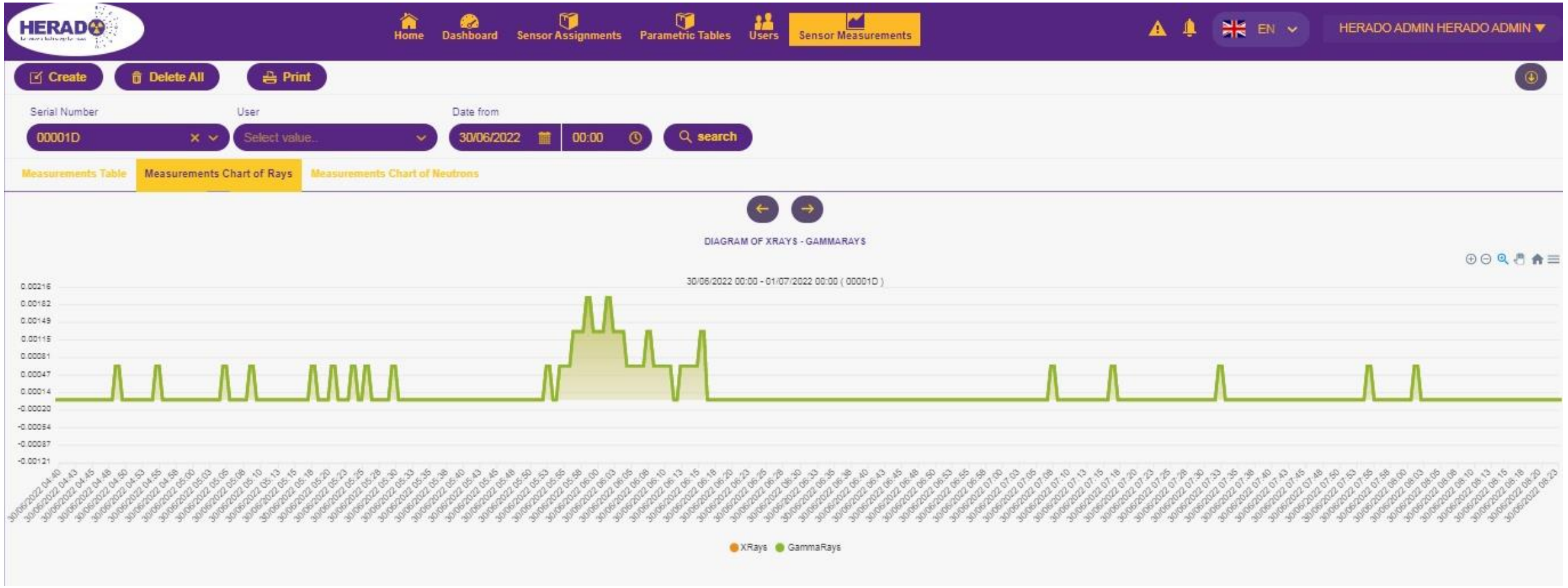
Irradiation at HIMAC Carbon (preliminary results)



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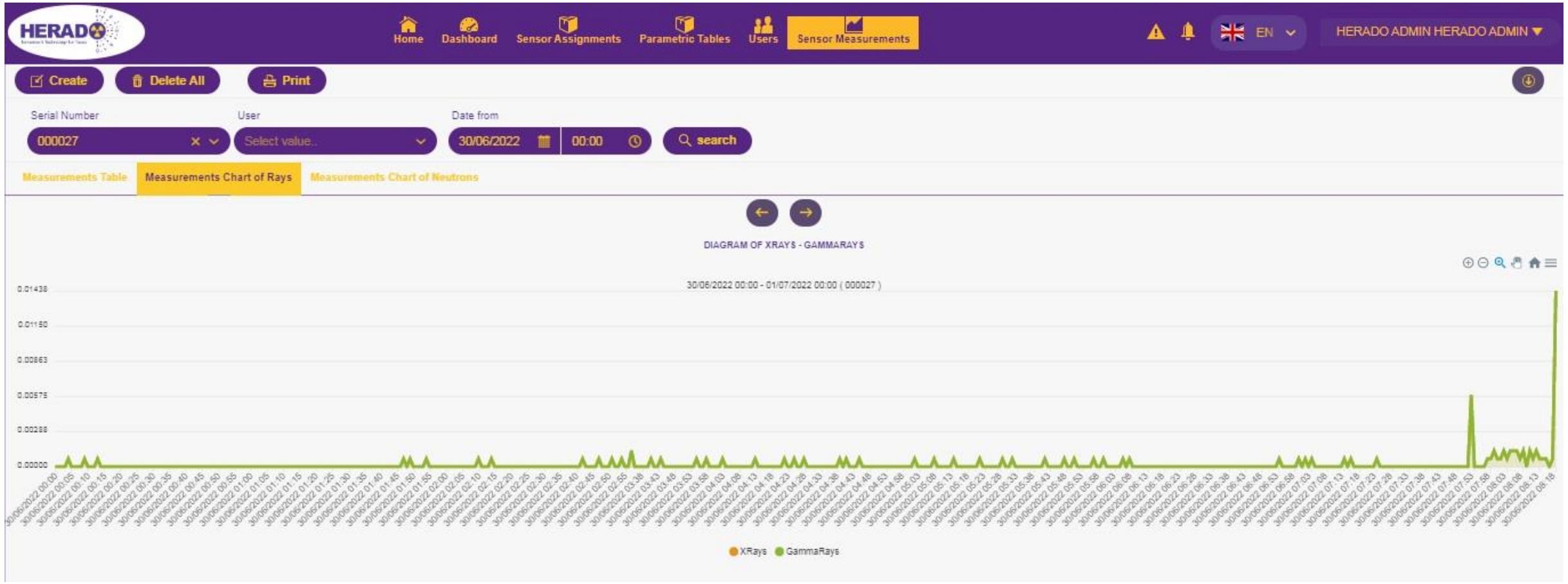
Irradiation at HIMAC Si (preliminary results)



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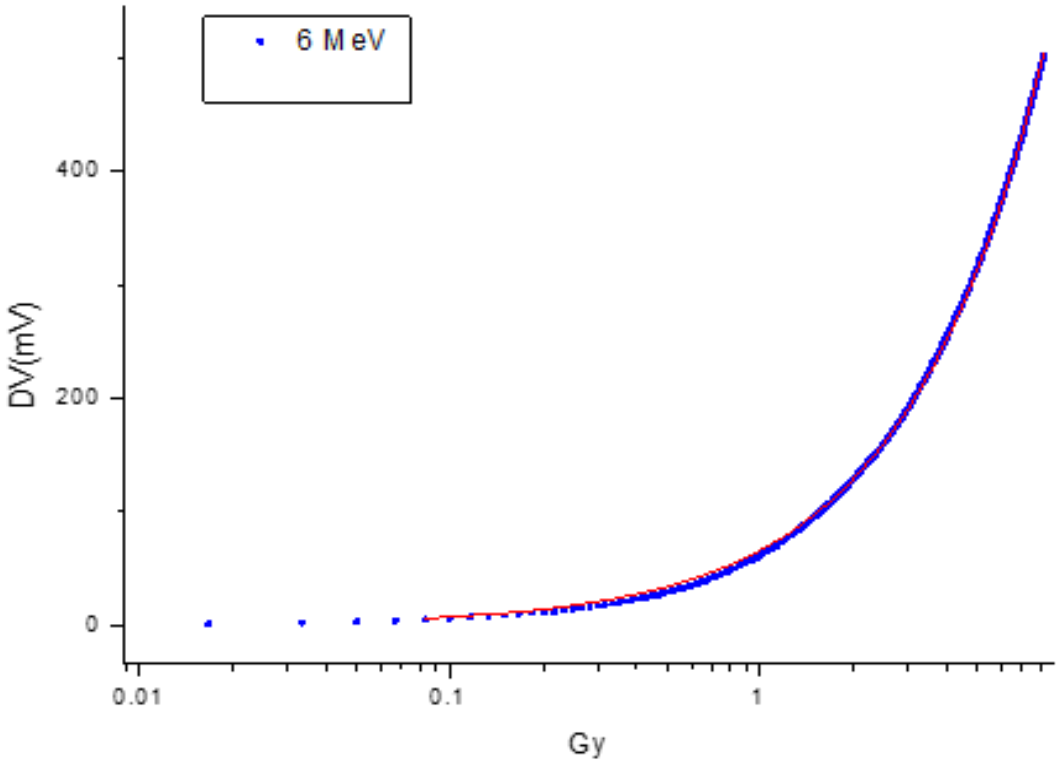
ALMAR Active dosimeter Properties According to IEC61526

SPECIFICATIONS	ALMAR+ NEUTRONS	ALMAR
	Neutron Hp(10)	Gamma X-Rays Hp(10)
DETECTOR	Silicon based	Silicon based
MEASUREMENT RANGE	Dose: 1,5 µSv-10 Sv Dose rate 1 µSv/h-10 Sv/h	Dose: 0,65 µSv-10 Sv Dose rate: 1 µSv/h –10 Sv/h
ACCURACY	Dose: ± 10% AmBe	Dose: ± 10% Cs-137
DOSE RATE LINEARITY	Dose Rate : 5% AmBe	Dose Rate : 5% Cs-137
ENERGY RESPONSE	Linear up to 10 Sv Thermal-epithermal 0.025 eV to 100 keV intermediate fast 100 keV to 5 MeV	Linear up to 10 Sv From 3 KeV
ANGULAR DEPENDENCE	5 %	5 %
WEIGHT	25 gr	25 gr
BATTERY	Rechargeable 14 days (continuously)	Rechargeable 14 days (continuously)
TEMPERATURE	-30o to 50o	-30o to 50o
ALARM	Visual and audio	Visual and audio
ENVIROMENTAL PROTECTION	IP68	IP68

ALMAR Active dosimeter Properties According to IEC61526

SPECIFICATIONS	
	Beta Hp(0,07) and Hp(10)
DETECTOR	Silicon based
MEASUREMENT RANGE	Dose: 1,5 µSv-10 Sv Dose rate 1 µSv/h-10 Sv/h
ACCURACY	Dose: ± 10% $^{90}Sr/^{90}Y$
DOSE RATE LINEARITY	Dose Rate : 5% $^{90}Sr/^{90}Y$
ENERGY RESPONSE	Linear up to 10 Sv 0.2 Mev-15 MeV
ANGULAR DEPENDENCE	5 %
WEIGHT	25 gr
BATTERY	Rechargeable 14 days (continuously)
TEMPERATURE	-30º to 50º
ALARM	Visual and audio
ENVIROMENTAL PROTECTION	IP68



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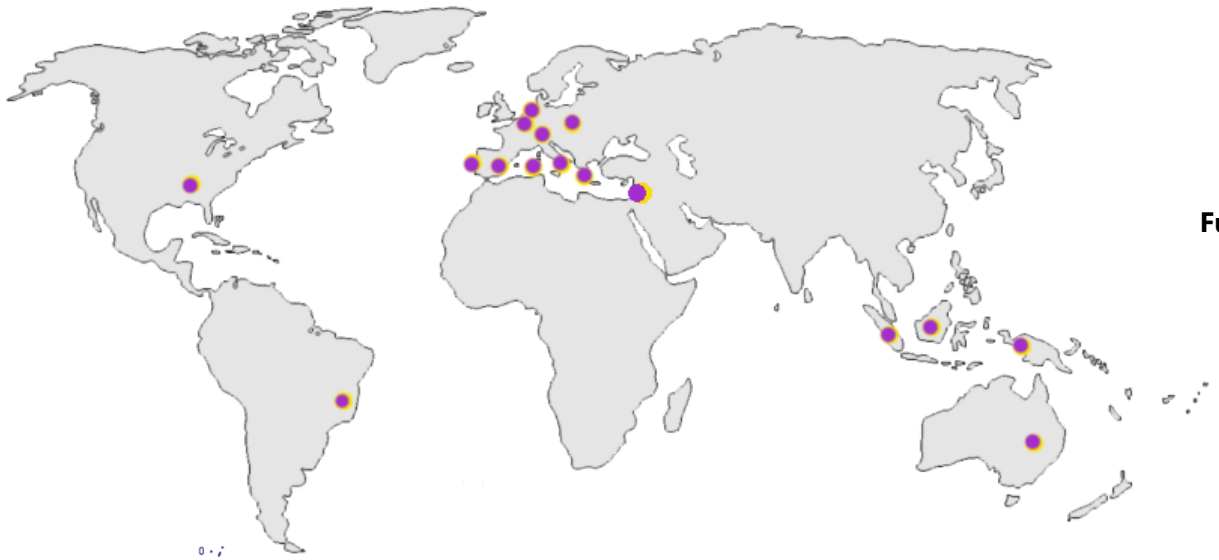
HERADO Certifications Patents and Compliance

HERADO is **fully licensed CE** (EN 61526) and **accredited**.

Collaborating with **Radiation Federations**, **EEAE** (Greek Atomic Energy) running **pilots** with **hospitals**. At the forefront of the **new** EU **legislation** about the necessity of active dosimeters (October 2021).

Established **distributors Agreements** (Companies with extended portfolio of customers in radiation protection in the medical sector): Belgium, Netherland, Germany, Luxembourg, Italy, Portugal, Switzerland, Spain, Malta, Singapore, Indonesia, Israel, Malaysia, Australia Greece, Brazil and USA. (23,017 **Group** hospitals)
HERADO has the seal of excellence as one of the **top startups**



Distributors

Fully licensed CE (EN 61526)

Patented granted (PCT/GR2021/00053)

HERADO's Platform GDPR compliant

Sustainability

Environmental, Social, Governance

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Collaboration with AIRE Institute

The Atmospheric Ionizing Radiation Environment (AIRE) Institute, headquartered at Oklahoma State University, is the first research institute in the US focused primarily on the study of the steady state ionizing radiation environment in the atmosphere and its effects on life, the greater environment and on technology.

ALMAR Air Personal Aviation Dosimeter

Each Dosimeter contains 1 to 4 Si MOSFET radiation detectors

ALMAR Air will have one bare detector, one covered with polyethylene radiator and one covered with a ^{6}Li radiator.

WiFi and USB connectivity

The aviation version of Almar Air dosimeter can thus serve as a personal dosimeter for future space tourists, as we as pilots, flight attendants and passengers on commercial, business and military aircraft.

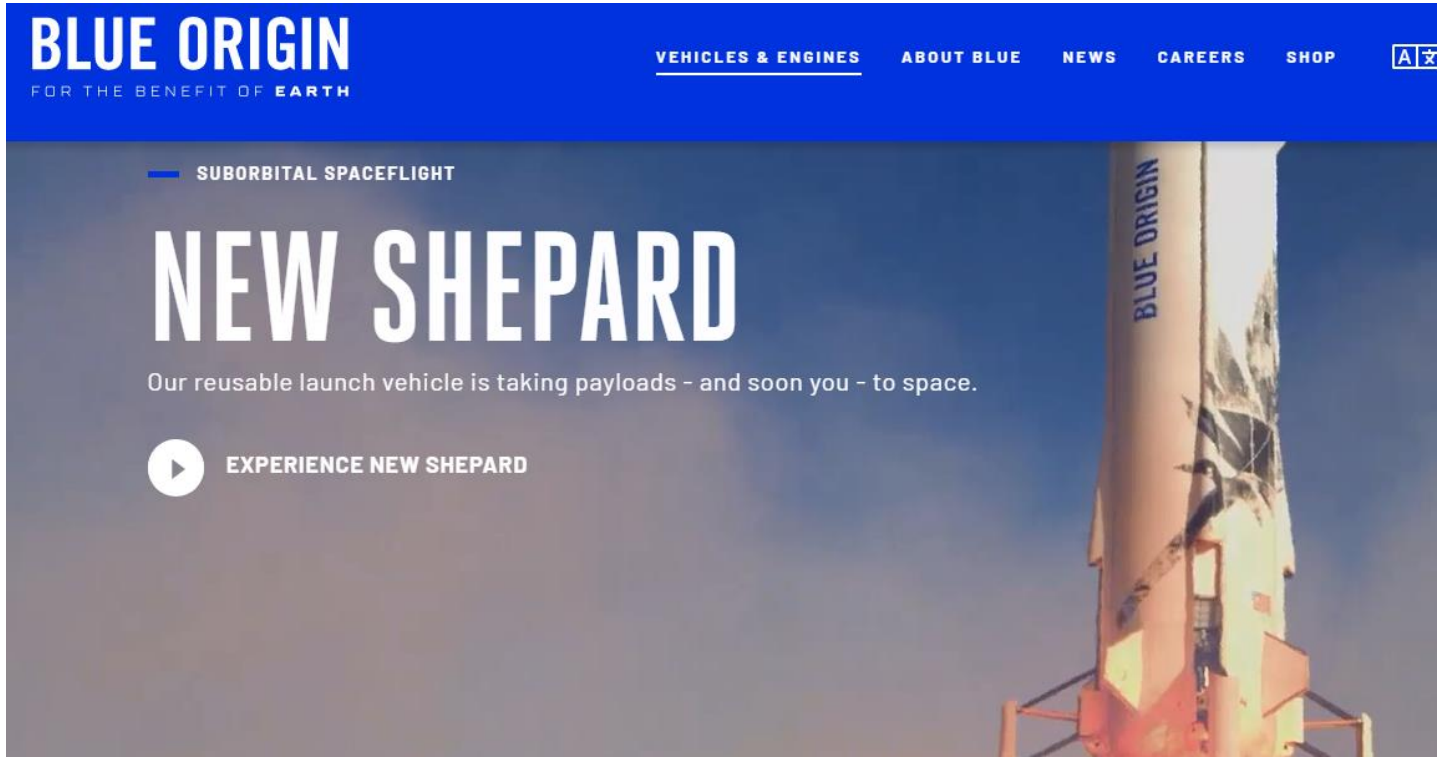
Upcoming Flight Opportunities:

Excited to be included in:

Blue Origin New Shepard suborbital flight

Named after Mercury astronaut Alan Shepard, the first American to go to space, New Shepard is \suborbital rocket system designed to take astronauts and research payloads past the Kármán line – the internationally recognized boundary of space.

https://www.blueorigin.com/new-shepard/



Upcoming Flight Opportunities:

Excited to be included in:

Artemis II mission

Contact and Disclaimer

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Continued focus on ESG
Lower power consumption, rechargeable batteries

Enhance returns to shareholders
Continuous investment in organic and inorganic growth

Portfolio evolution
towards higher-growth end markets, mitigating business risks

Accelerated growth in line with global megatrends
IoT clever device, Digital AI protocol

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