"МИС-РТ"-2022 Сборник № 82-2 http://ikar.udm.ru/mis-rt.htm

Intermittent glow of humid air induced by incident UV-photons.

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OUTLINE

Natural air is always humid.

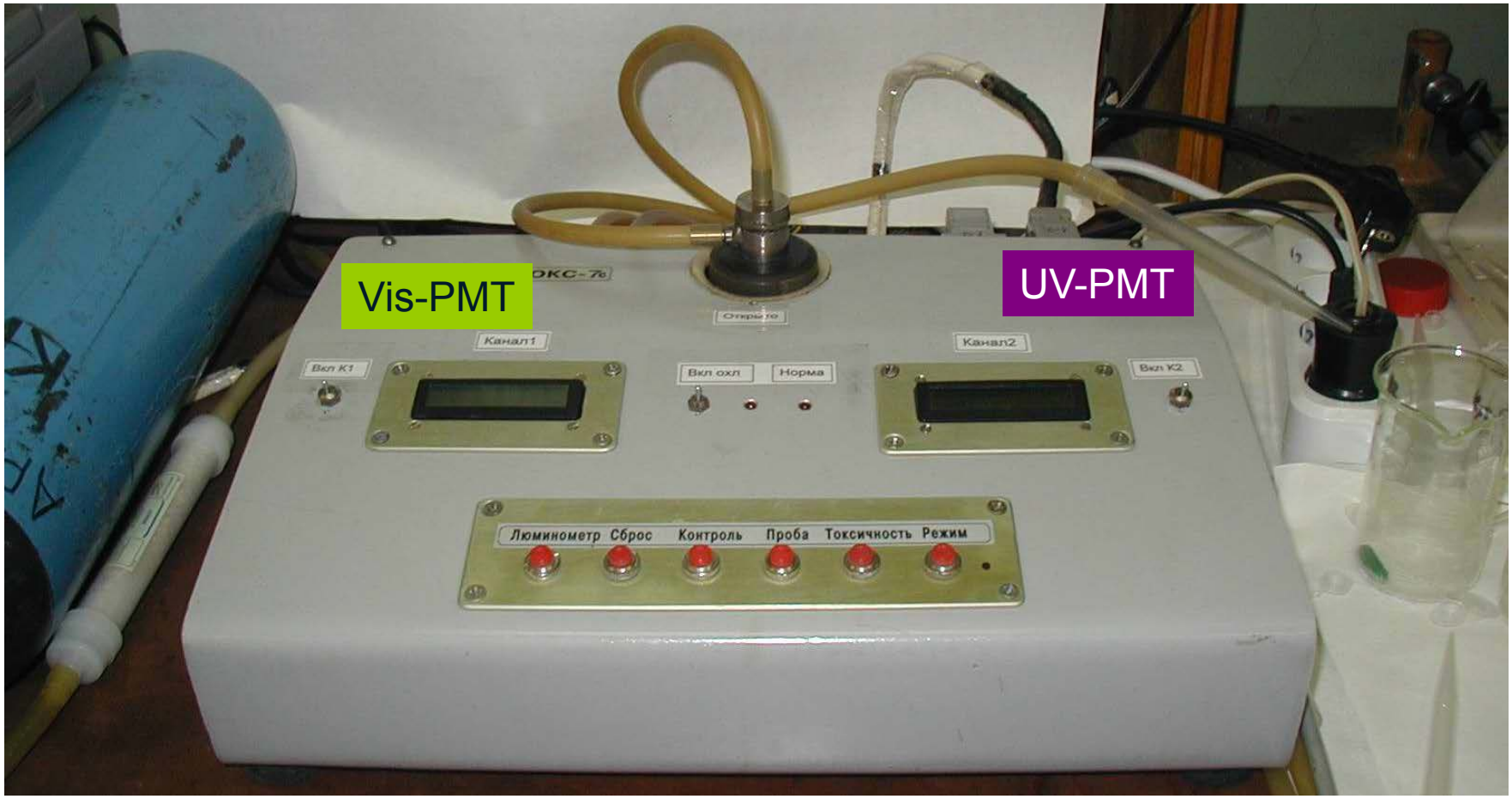
All natural surfaces are hygroscopic – they are covered with water films.

Incoming UV-photons may break up water molecules in a film. This is followed with a chain reaction of water oxidation accompanied with a flash of emission of UV- and VIS-photons.

This spark initiates oxidative reactions in humid air contacting a film. Substances present in the air turn into electronically excited state or ionize.

Electronic excitation propagates in humid air on macroscopic distances due to self-sustaining reactions.

Excitation in the air is capable for self-organization expressed in its oscillatory wave character.



Single photon counter «Biotox-7c» is equipped with two PMTs:

UV-sensitive FEU-142: range 112-365 nm, max. sensitivity 250-260 nm, 1700 V operation potential;

Vis-sensitive FEU-101: range 300-650 nm, max. sensitivity 380-490 nm, 800 V operation potential.

Sketch of the photon counter

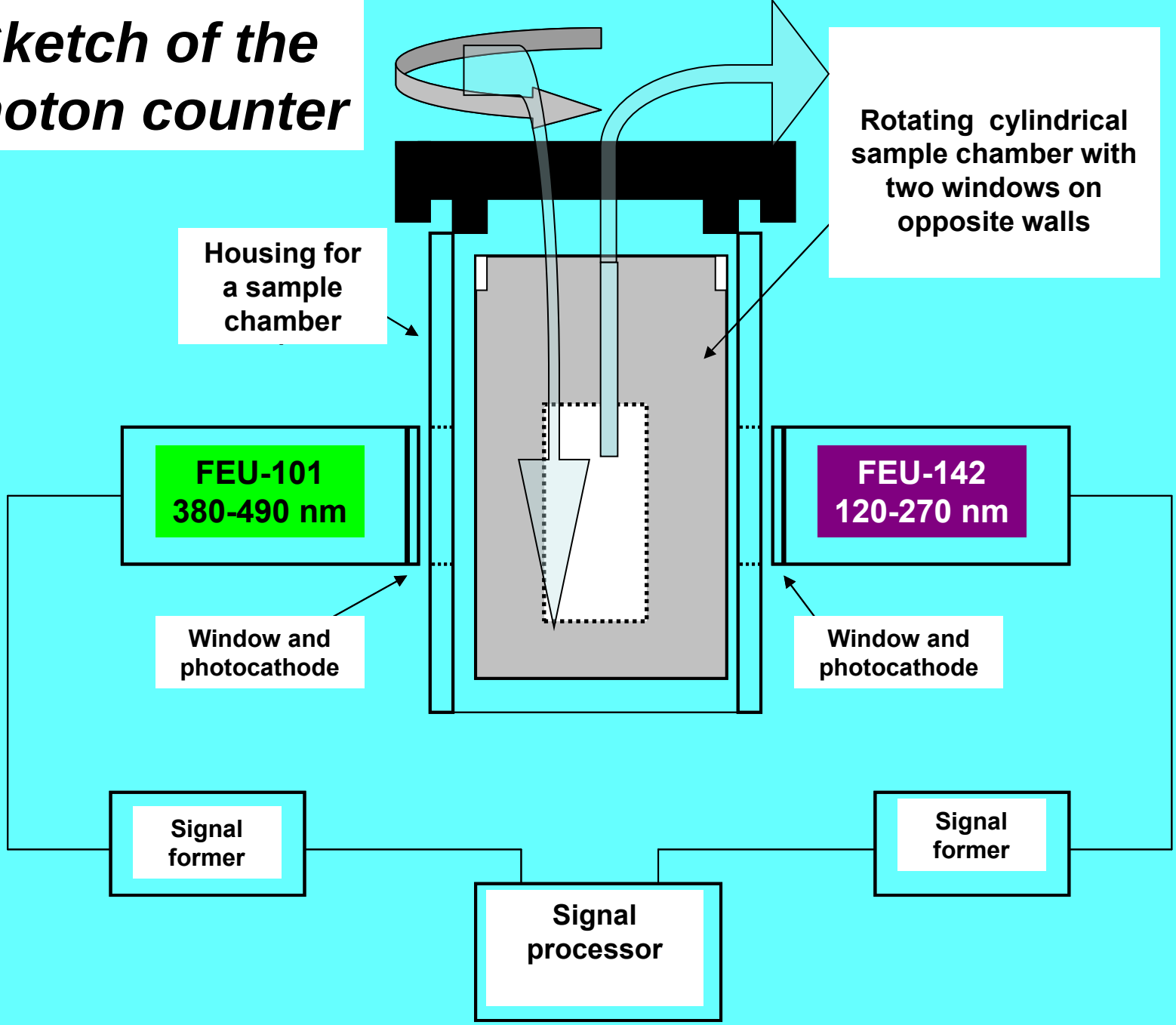
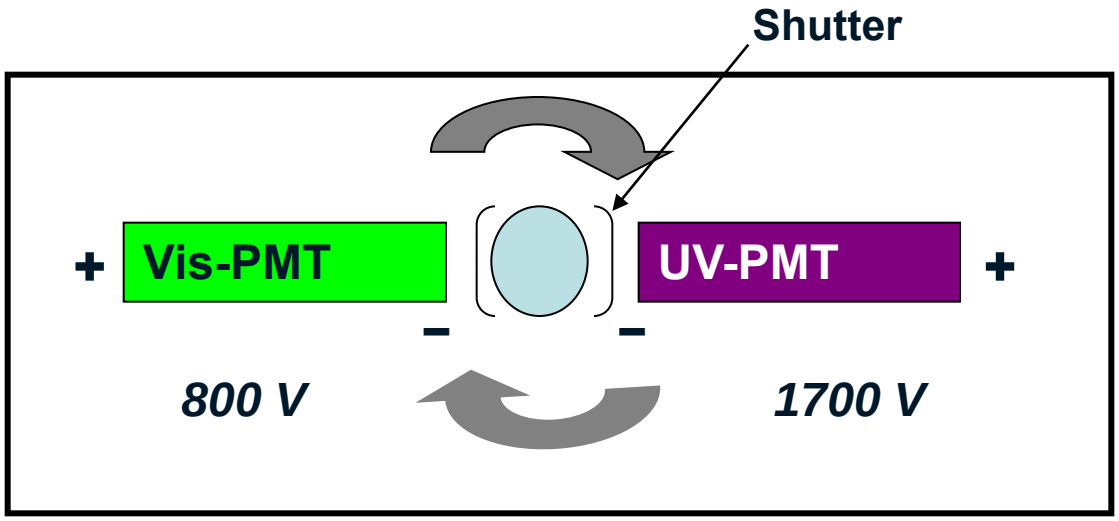


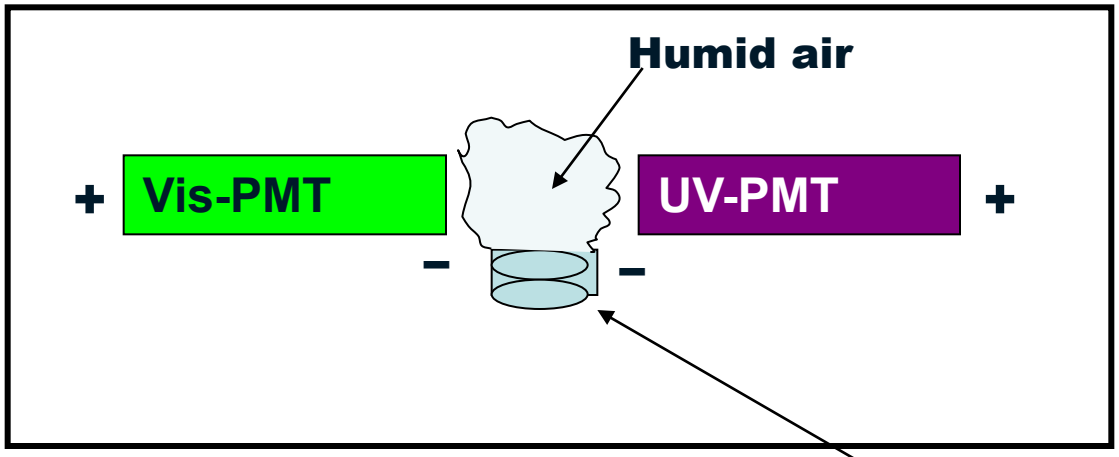
Diagram of the device and of a typical experiment

Top view

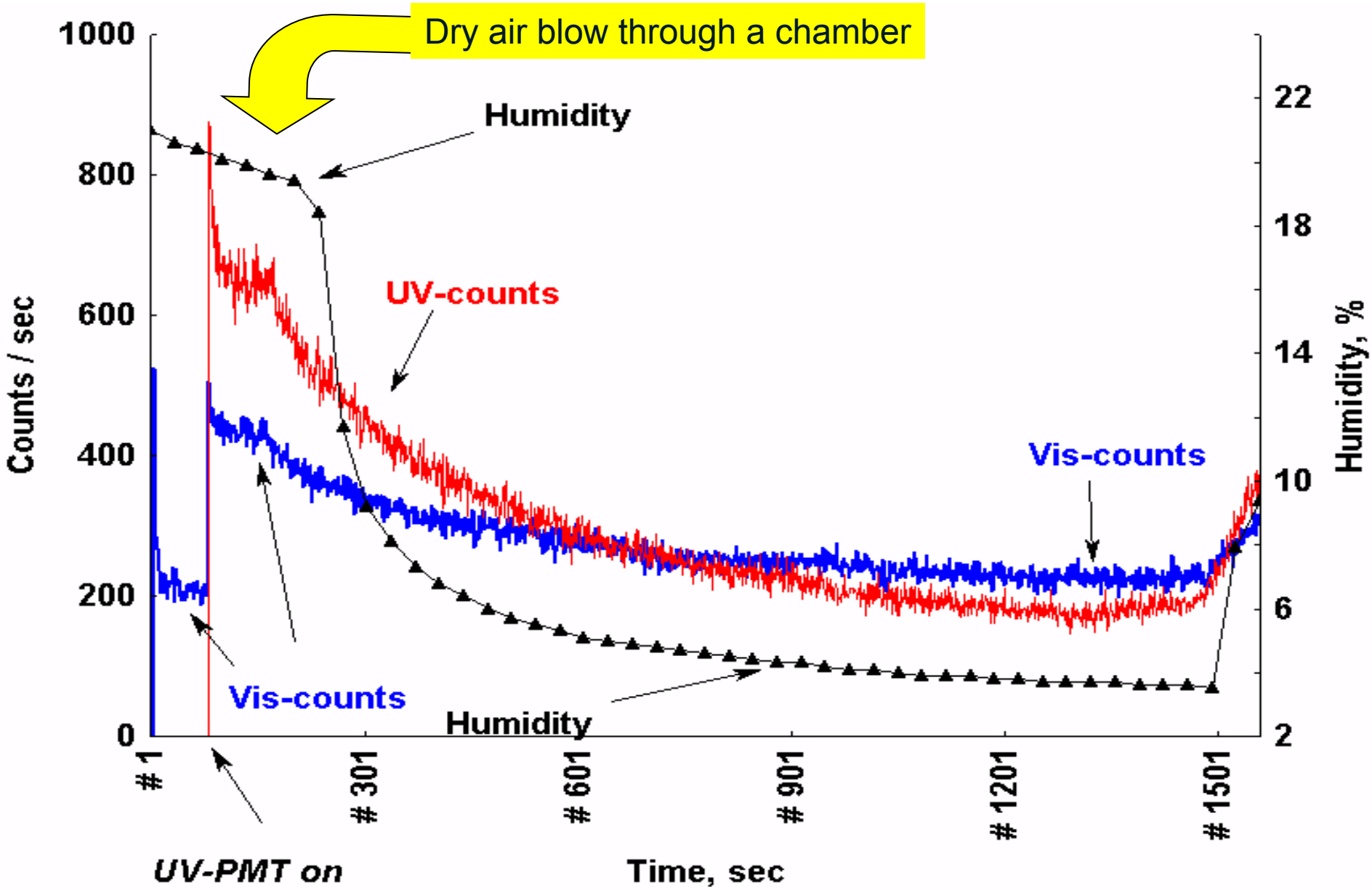


cathodes are grounded

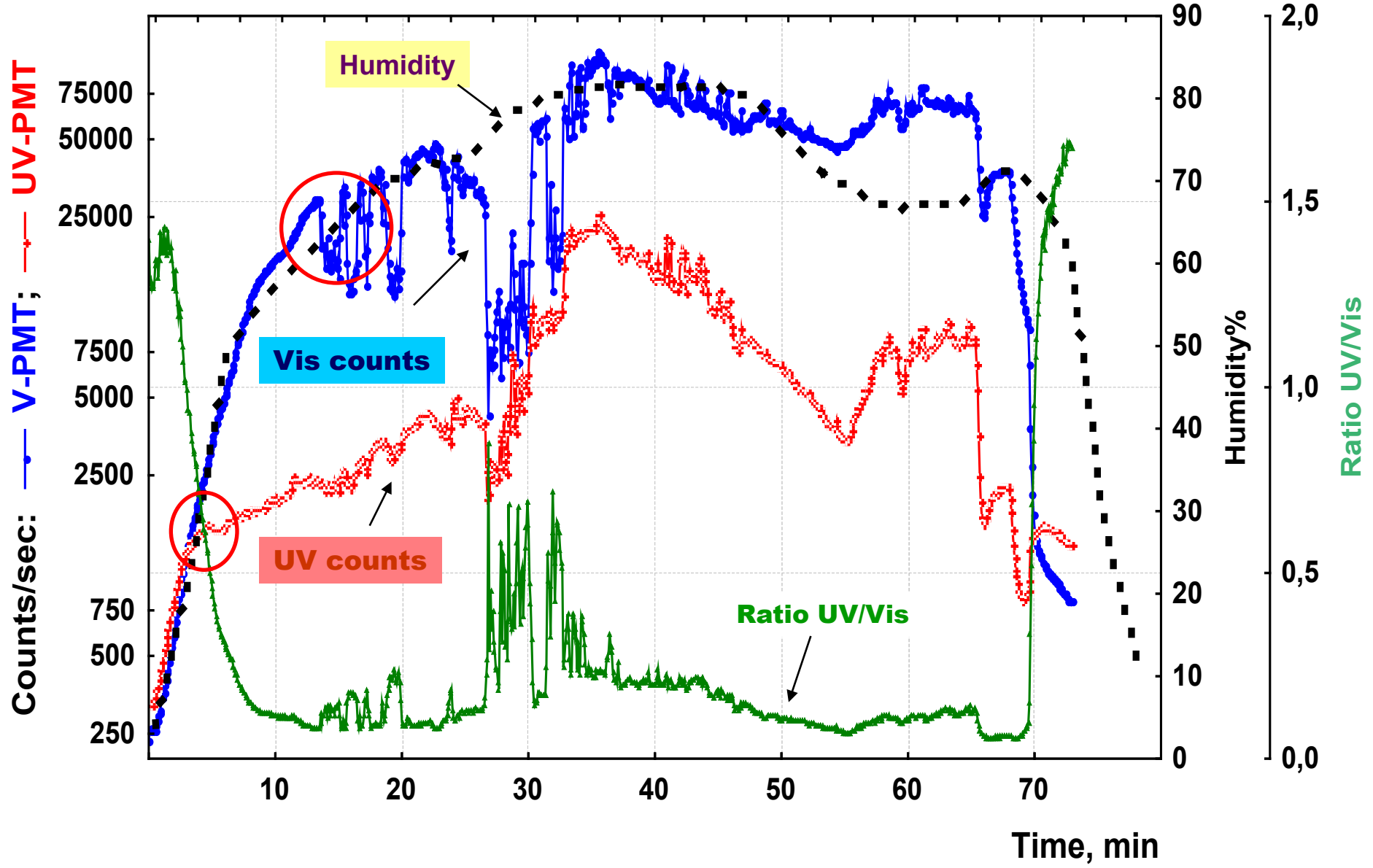
Side view



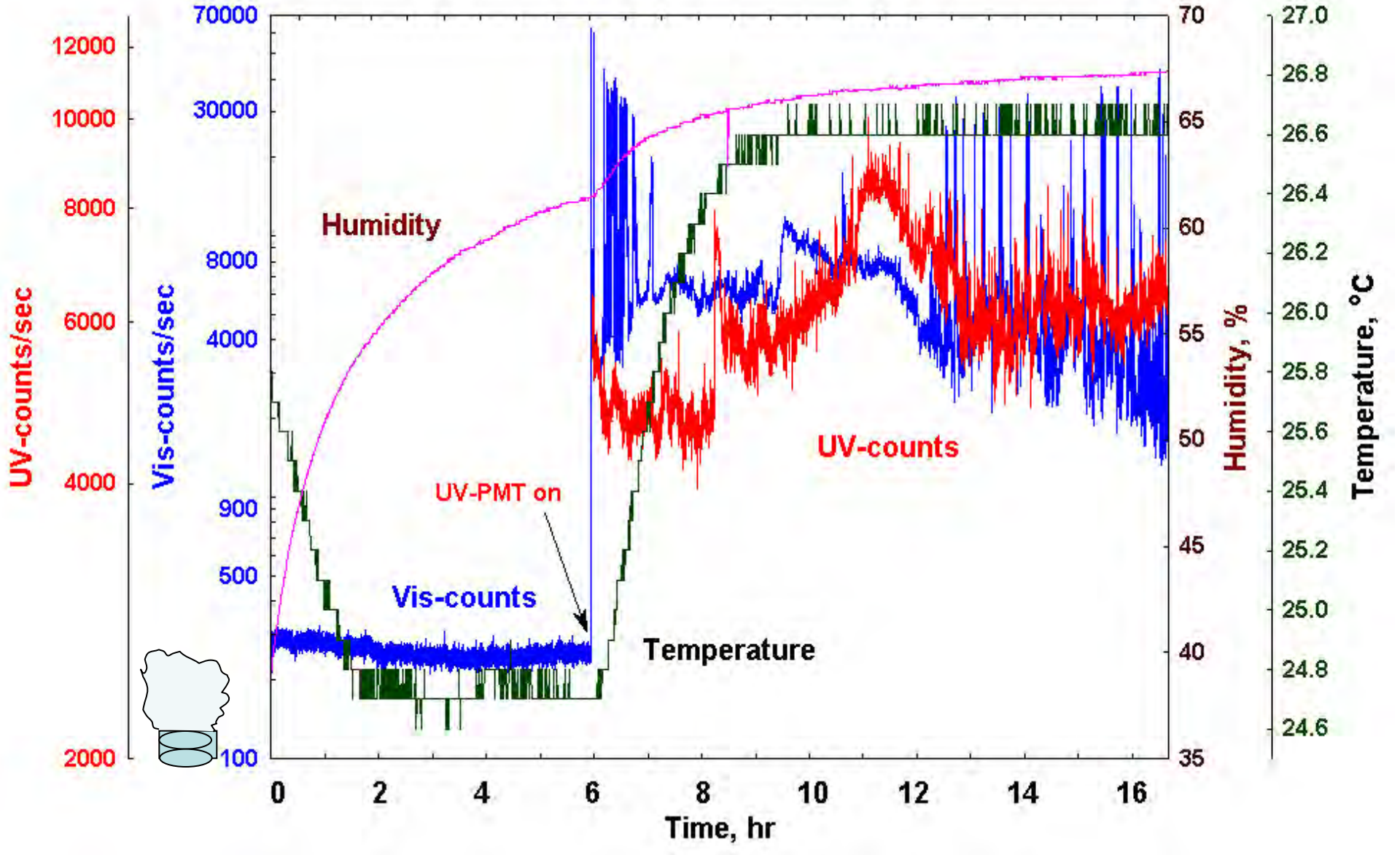
Effect of air humidity in a sample chamber upon Vis- and UV-photons counts provided by existence of an optical contact between UV- and Vis-PMTs.



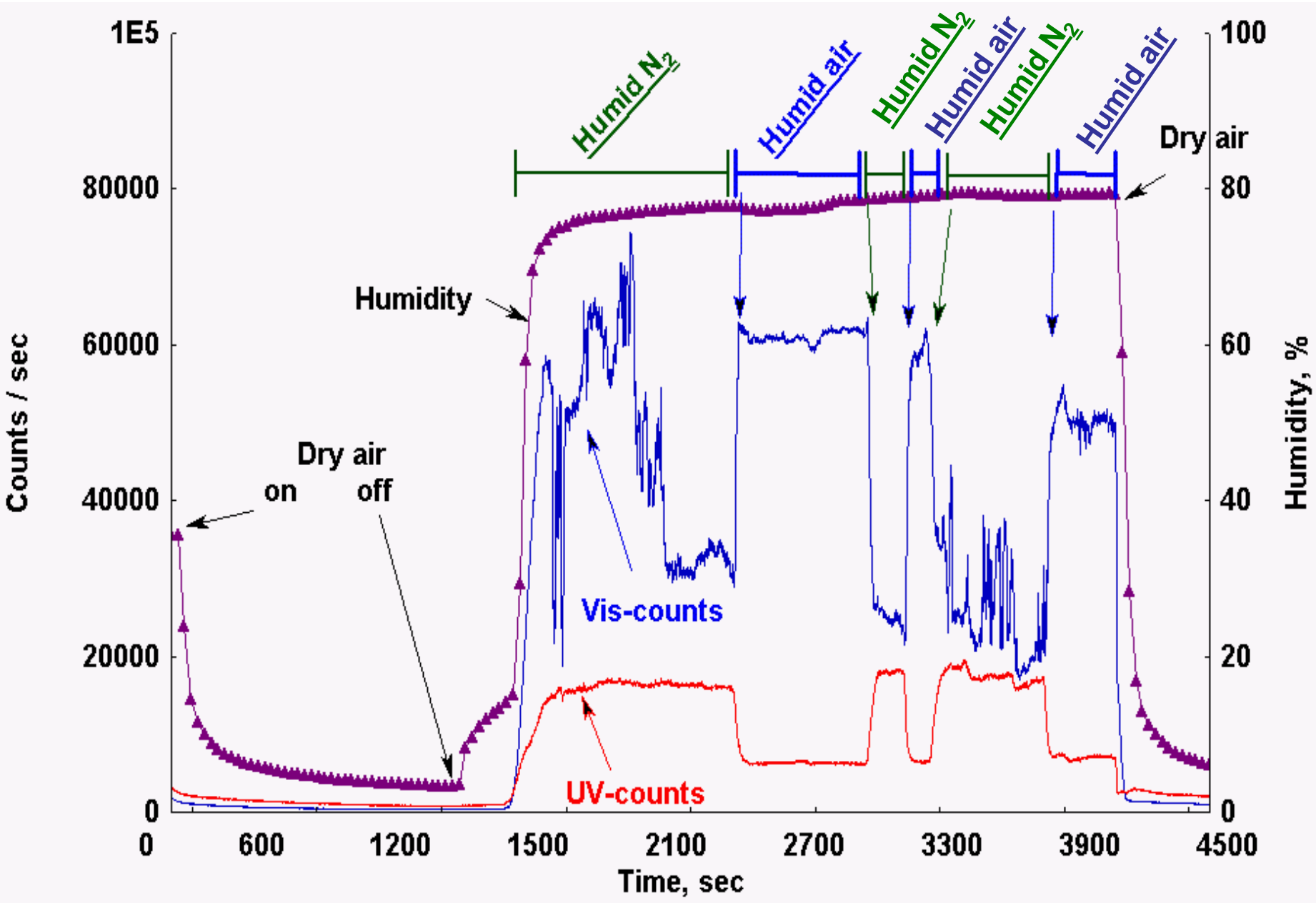
Dependence of photon count rate of UV- and Vis-PMT and of the ratio UV / Vis count rate upon air humidity.



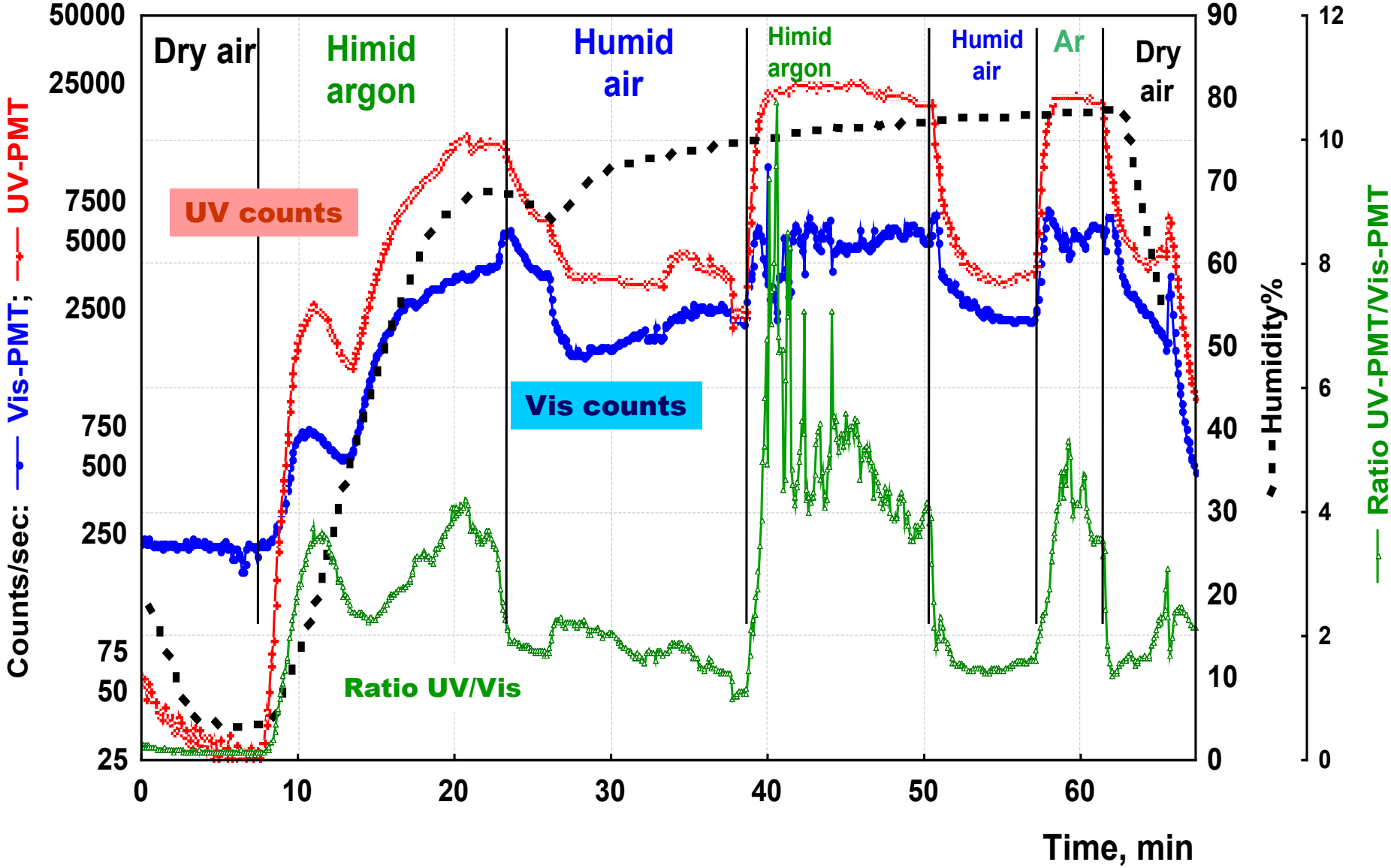
No effect of air humidity on Vis-photon counts was registered if UV-PMT is turned off. As UV-PMT is switched on, Vis-photons count rate increases and starts to oscillate; temperature in the chamber rises.



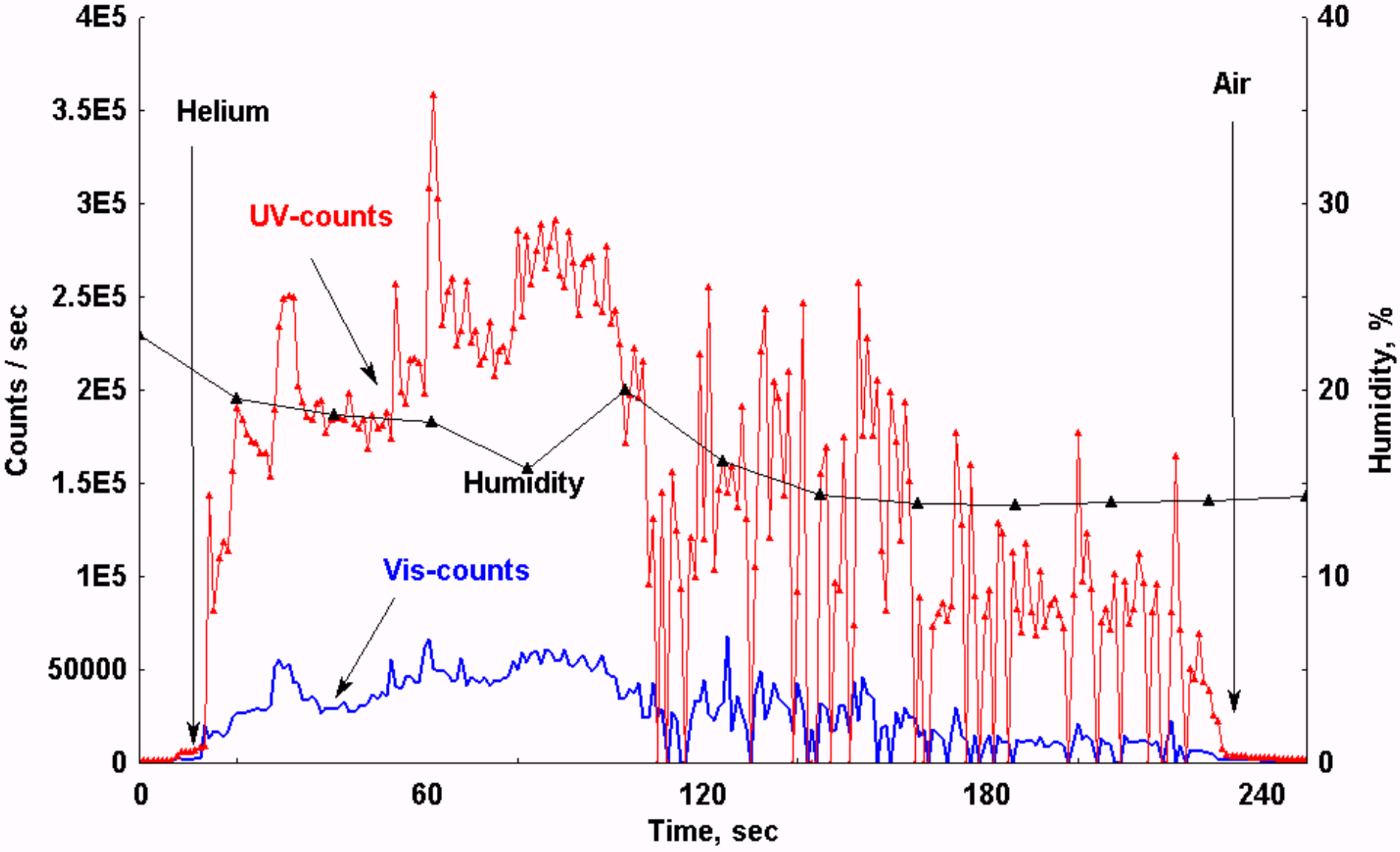
Chamber purging with air enriched with NITROGEN results in elevation of UV-photon count rate and drop in Vis-photon count rate



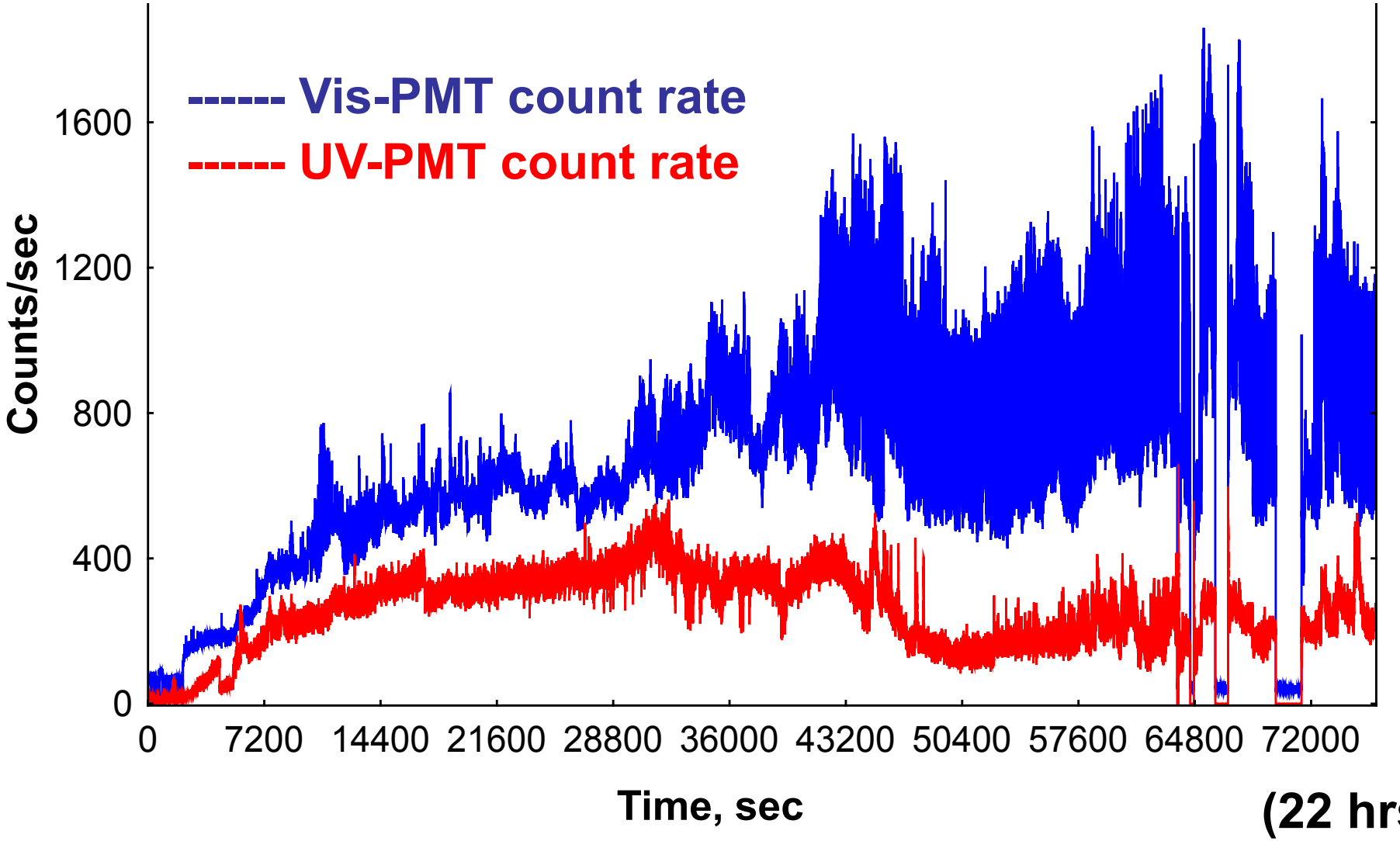
Chamber is purged with air enriched with ARGON: UV-photon count rate exceeds Vis-photon count rate

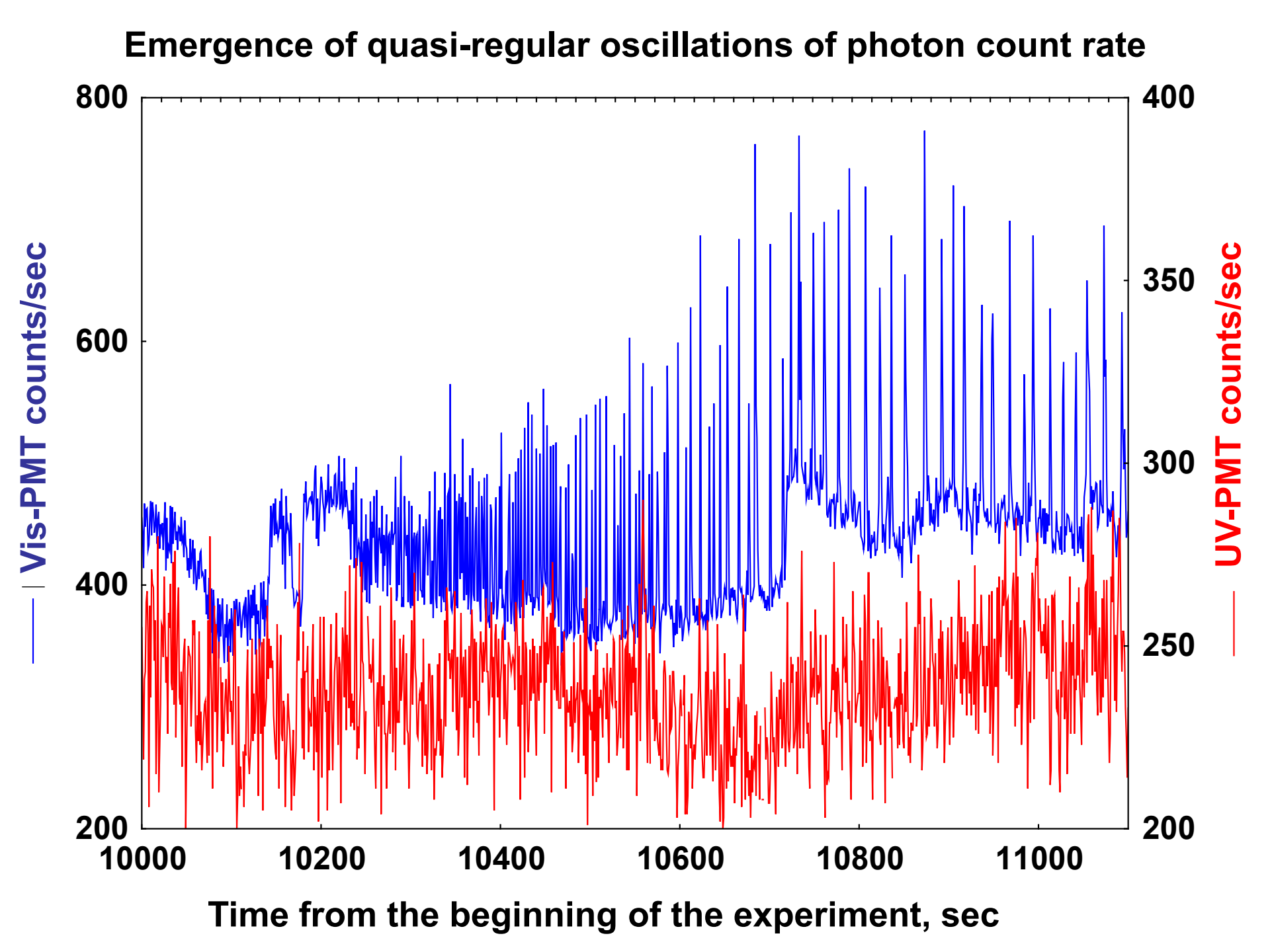


Chamber is purged with air enriched with HELIUM: great elevation of UV-photon count and immense high frequency oscillations

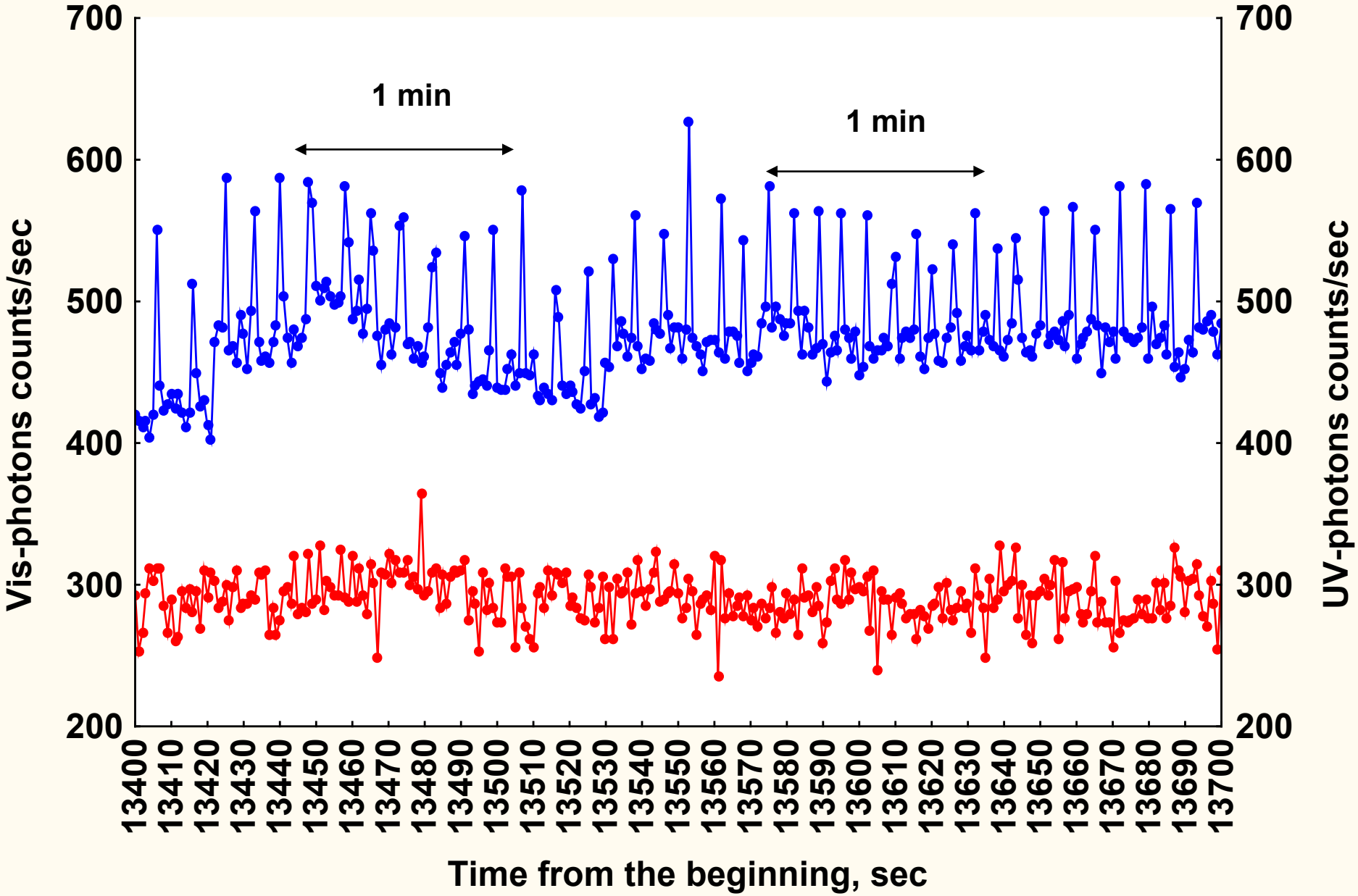


Development of oscillations of photon emission in a long-term experiment at constant high humidity of air in a chamber.

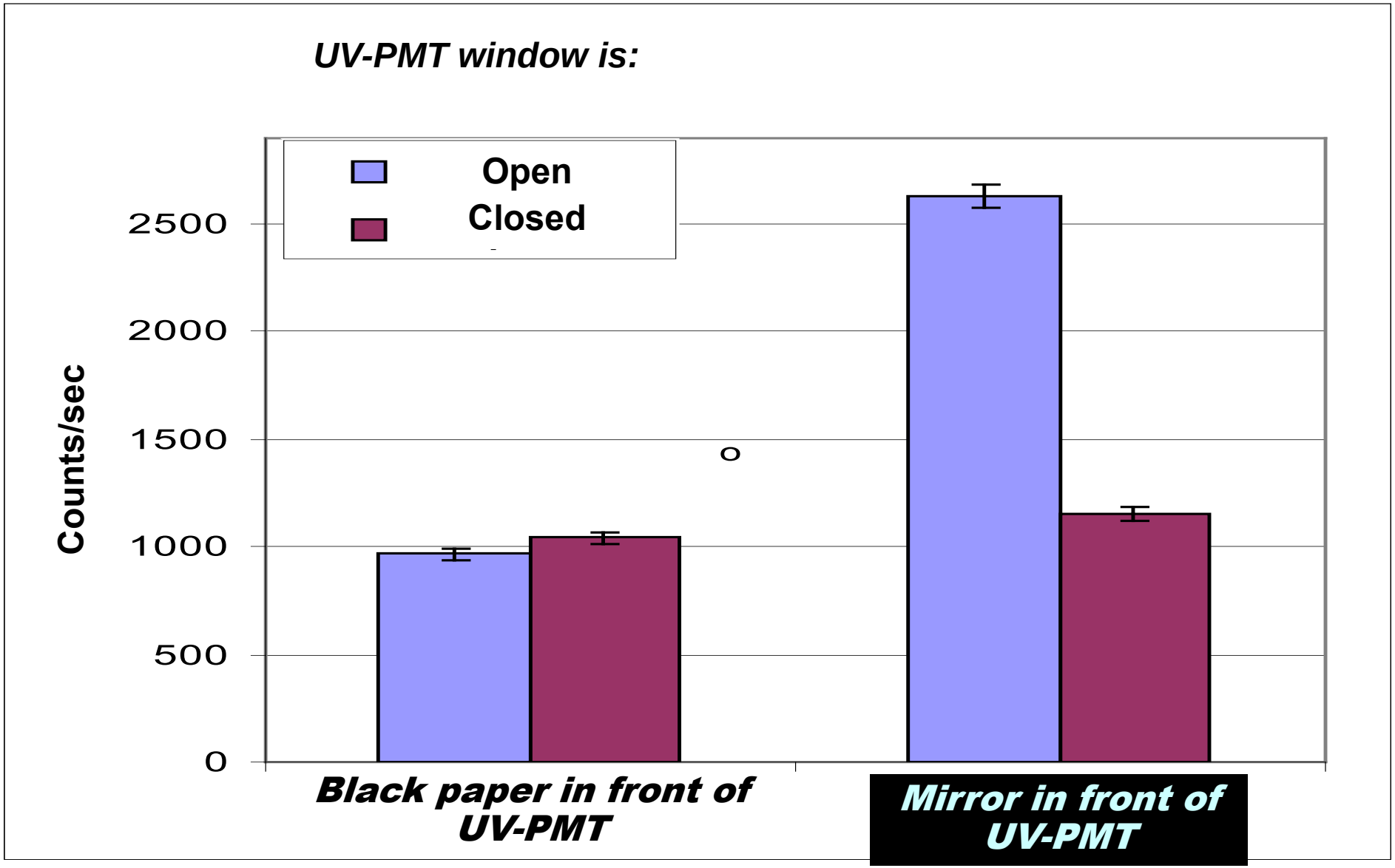



Emergence of quasi-regular oscillations of photon count rate
Vis-PMT counts/sec
UV-PMT counts/sec
800
600
400
200
400
350
300
250
200
10000
10200
10400
10600
10800
11000
Time from the beginning of the experiment, sec

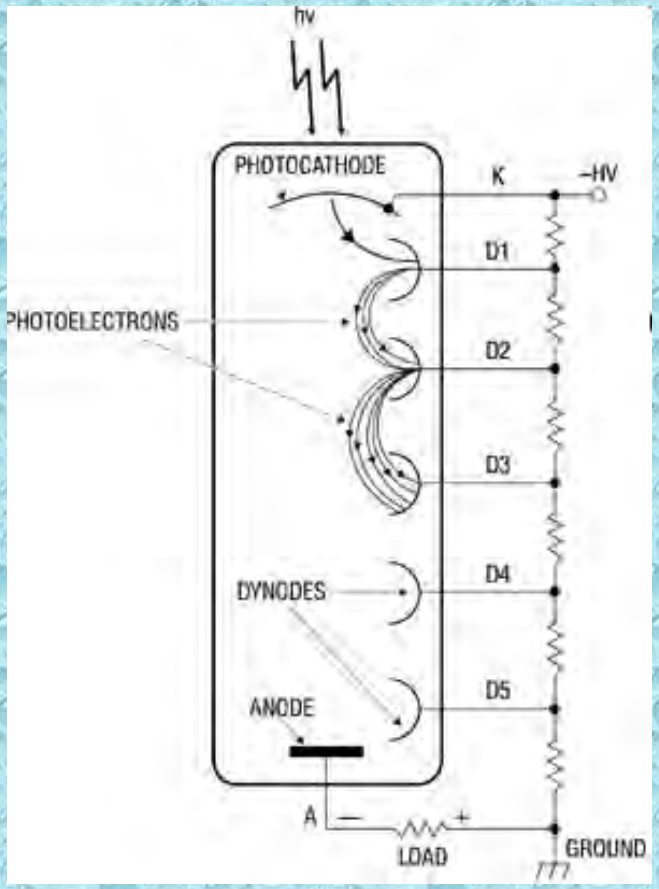
One of the periods of regular oscillations (waves) of Vis-photon count rate (3,5 hours after the beginning if the experiment, Humidity > 60%)



Installation of a glass mirror in front of the UV-PMT face results in the rise of photon count rate.
When UV-PMT faces the screen made of black paper its photon count rate diminishes.



Possible reasons of photon emission from UV-PMT face



- *Luminescence originates in PMTs body during their functioning*
- *Incident photons may escape from PMT body back to the chamber*
- *FEU-142 window is made of MgF_2 – a hygroscopic crystal*
- *Water film should arise on the surface of the window in humid atmosphere*

Water film

MgF_2 – a hygroscopic crystal

Absorption of UV-photons in water films results in explosive development of FREE RADICAL reactions

$$(H_2O)_n(H_2O..H\text{-}\int\text{-}OH)(H_2O)_m \rightarrow (H_2O)_{(n+1)}(H\downarrow) + (OH\uparrow)(H_2O)_m$$

$H\uparrow + \downarrow H \rightarrow H_2 + h\nu$

$H\uparrow + \downarrow H + O_2 \rightarrow H_2O_2 + h\nu$

$HO\downarrow + \uparrow OH \rightarrow H_2O_2 + h\nu$

$O_2 + H_2O \rightarrow H\text{-}O\text{–}O\text{–}O\text{-}H$

$O_2 + H_2O_2 \rightarrow H\text{-}O\text{–}O\text{–}O\text{–}O\text{-}H$

H_2O_3 и H_2O_3 – «explosives», sources of ozone and peroxide radicals

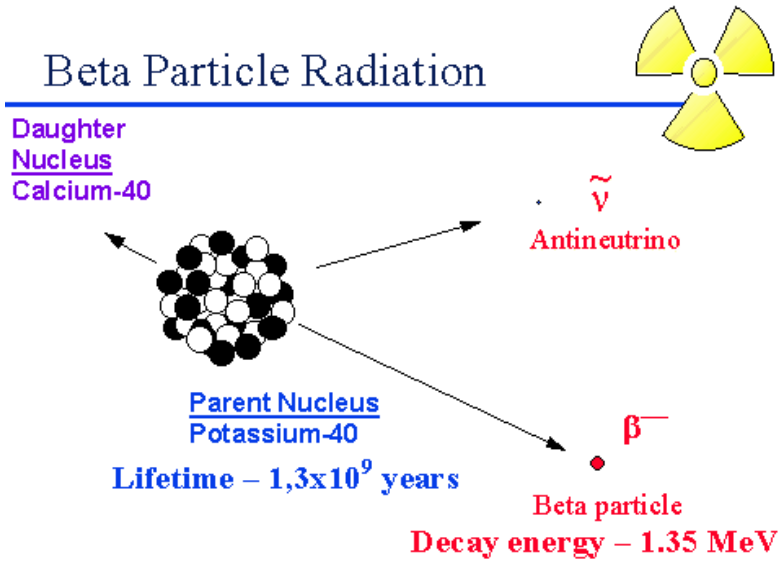
$2H_2O_2 \rightarrow 2H_2O + O_2 + h\nu$

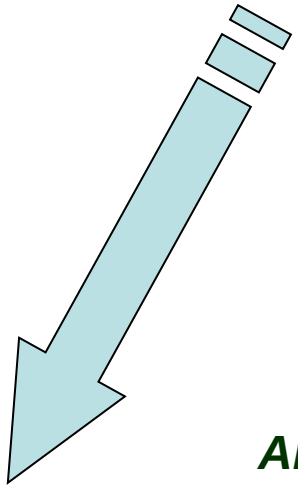
$(H\downarrow) + (OH\uparrow) \rightarrow H_2O + 5{,}2\ eV$

WHERE can it WORK?

Natural Radioactivity in your body

Nuclide	Total Mass of Nuclide Found in the Body	Total Activity of Nuclide Found in the Body	Daily Intake of Nuclides
Uranium	90 µg	30 pCi (1.1 Bq)	1.9 µg
Thorium	30 µg	3 pCi (0.11 Bq)	3 µg
Potassium 40	17 mg	120 nCi (4.4 kBq)	0.39 mg
Radium	31 pg	30 pCi (1.1 Bq)	2.3 pg
Carbon 14	95 µg	0.4 µCi (15 kBq)	1.8 µg
Tritium	0.06 pg	0.6 nCi (23 Bq)	0.003 pg
Polonium	0.2 pg	1 nCi (37 Bq)	~0.6 µg





Cherenkov radiation: coherent radiation in UV-range

Aromatherapy

Wood therapy

… etc.

SUMMARY

Natural air is always humid !

All natural surfaces are hygroscopic – they attract water and are covered with water films.

Incoming UV-photons may break up water molecules in a film. This is followed with a chain reaction of water oxidation accompanied with a flash of emission of UV- and VIS-photons.

Such a spark initiates oxidative reactions in humid air contacting a film. Substances present in the air turn into electronically excited state or ionize.

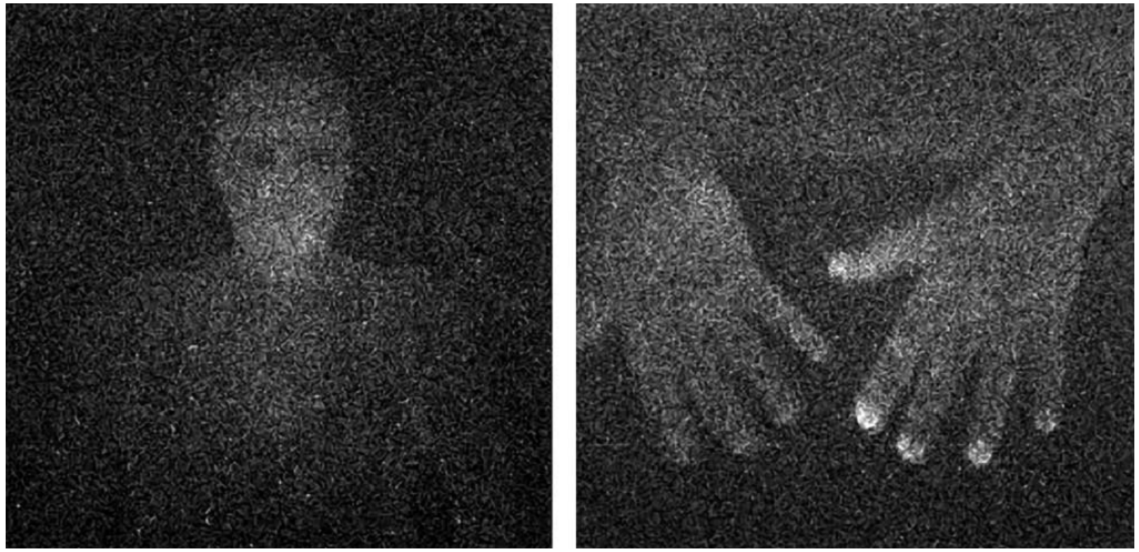
Electronic excitation propagates in the air on macroscopic distances due to self-sustaining chemical reactions.

Excitation in the air is capable for self-organization expressed in its oscillatory wave character.

Excited humid air is capable to change properties of water contacting it


Thank you

Photon emission from living organisms ("biophotons", "mitogenetic radiation")



E.P.A. Van Wijk et al.

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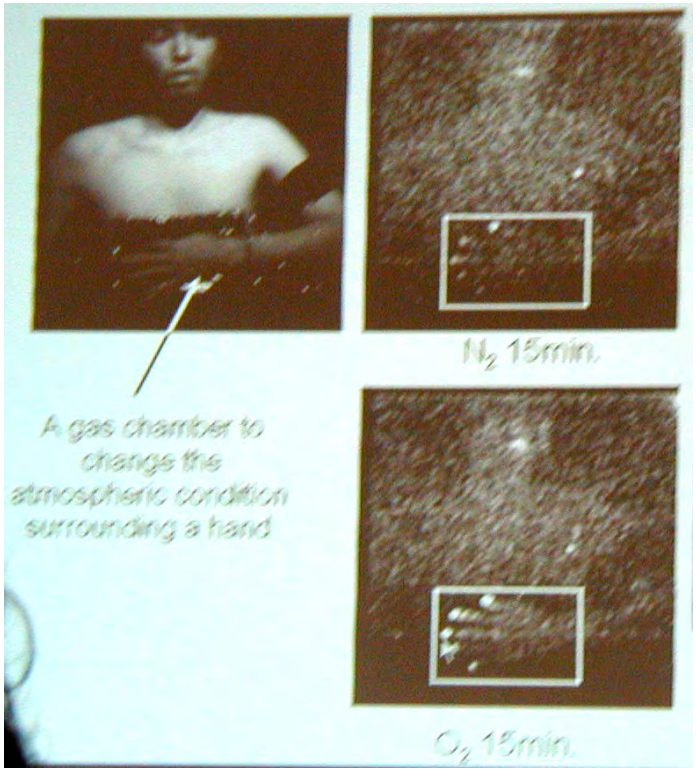

Why nails and teeth are the most intense "biophoton" emitters?