RuPAC 2014

October 09, 2014, Thursday,
Session 12. "Ion sources and electron guns"

INR RAS LINAC PROTON INJECTOR 100 Hz PRR OPERATION MODE

E.S. Nikulin, A.S. Belov, O.T. Frolov, L.P. Nechaeva, A.V. Turbabin and V.N. Zubets

nikulin@inr.ru

Institute for Nuclear Research of RAS, Moscow, Russia

Accelerator Complex Division

Laboratory of Injectors and Ion Sources

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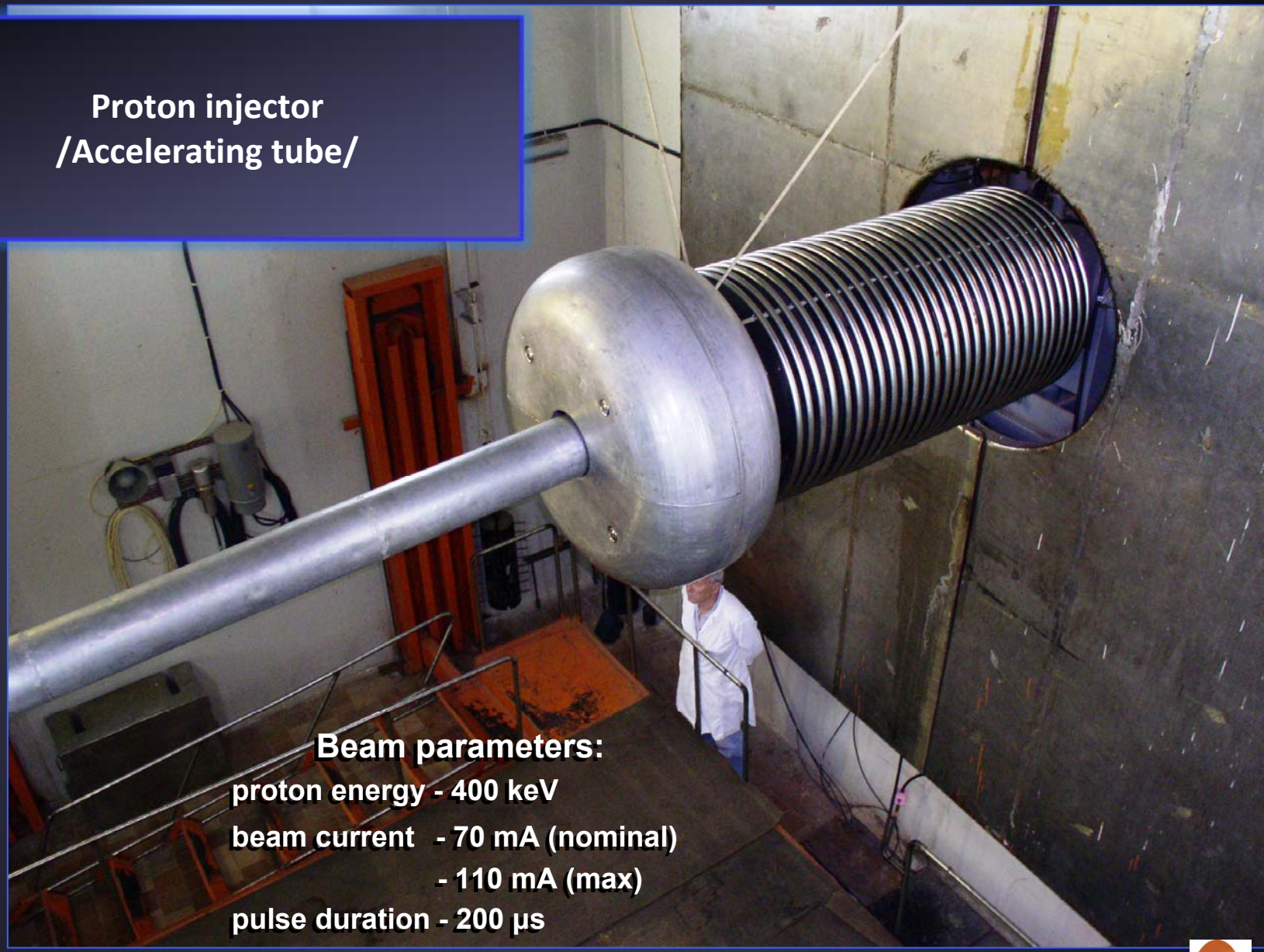
Proton injector /Accelerating tube/



Beam parameters:

proton energy - 400 keV

beam current - 70 mA (nominal)

- 110 mA (max)

pulse duration - 200 μs

repetition rate - 50 Hz

emittance (at nominal current) ≤ 0,15π cm·mrad

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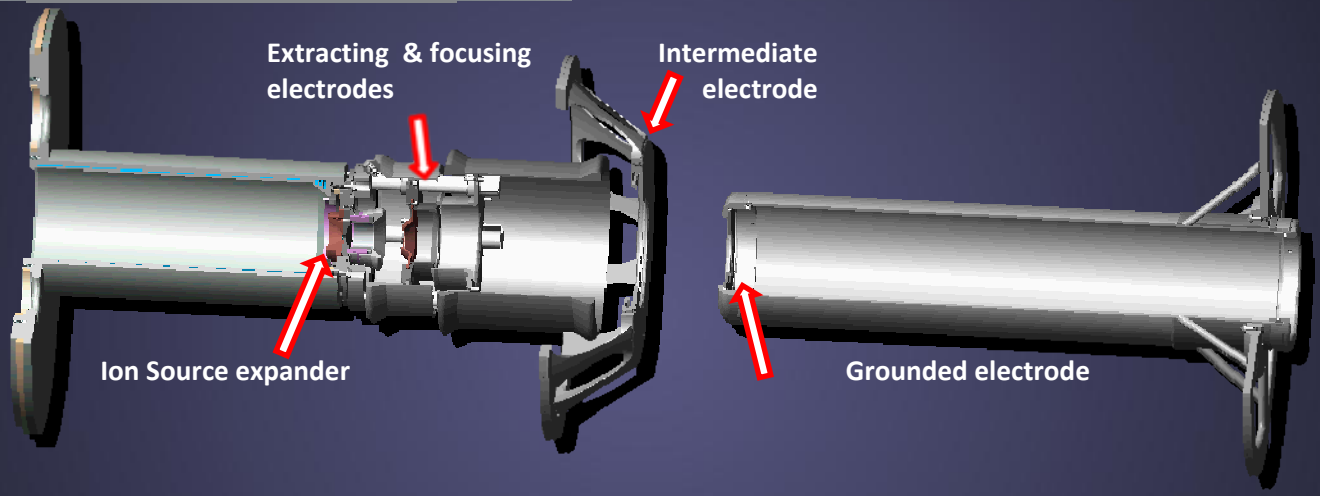
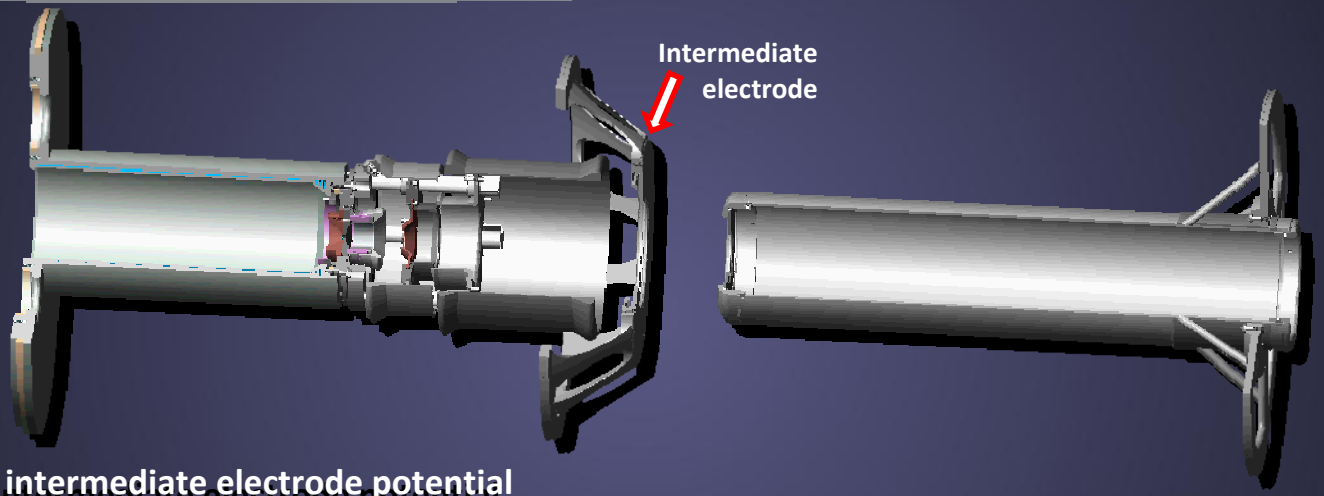
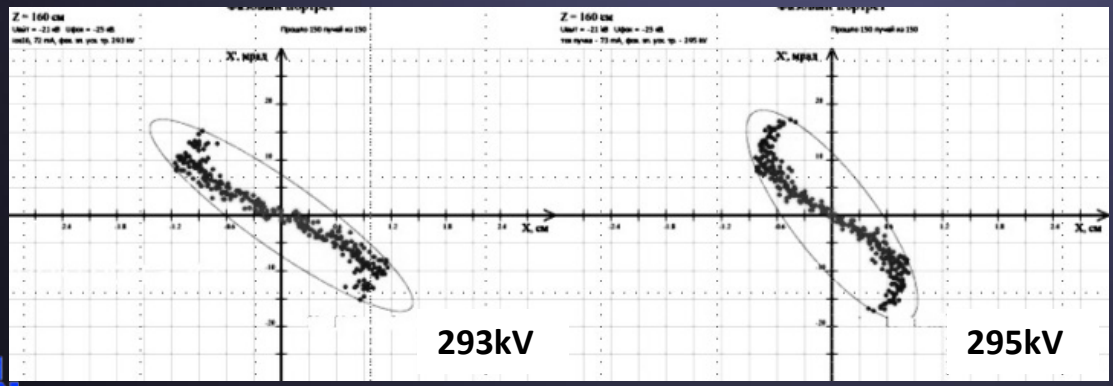
System of beam formation and preliminary acceleration (400keV) /Accelerating tube/



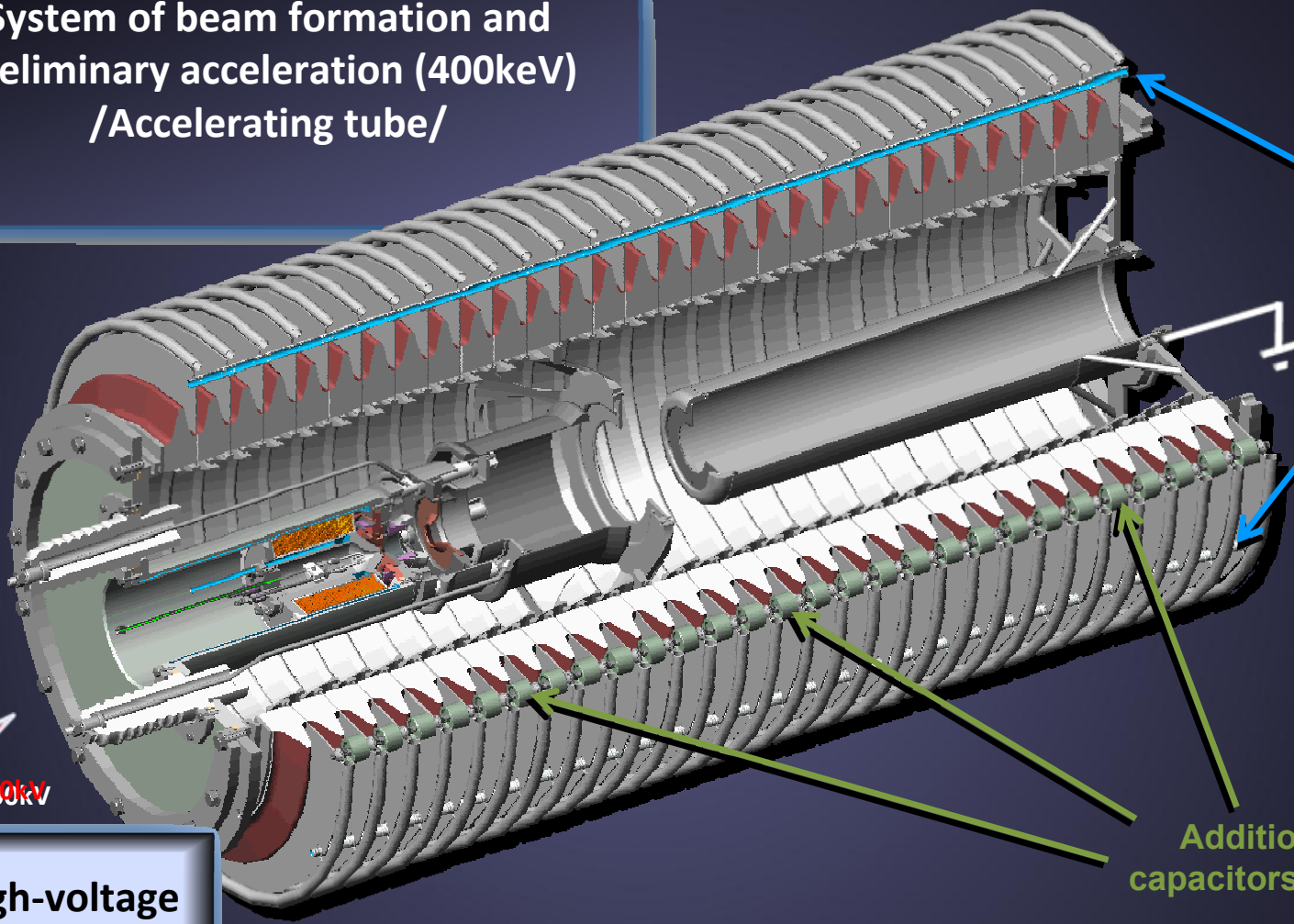
System of beam formation and preliminary acceleration (400keV) /Accelerating tube/



Influence of the intermediate electrode potential on position and shape of phase portrait



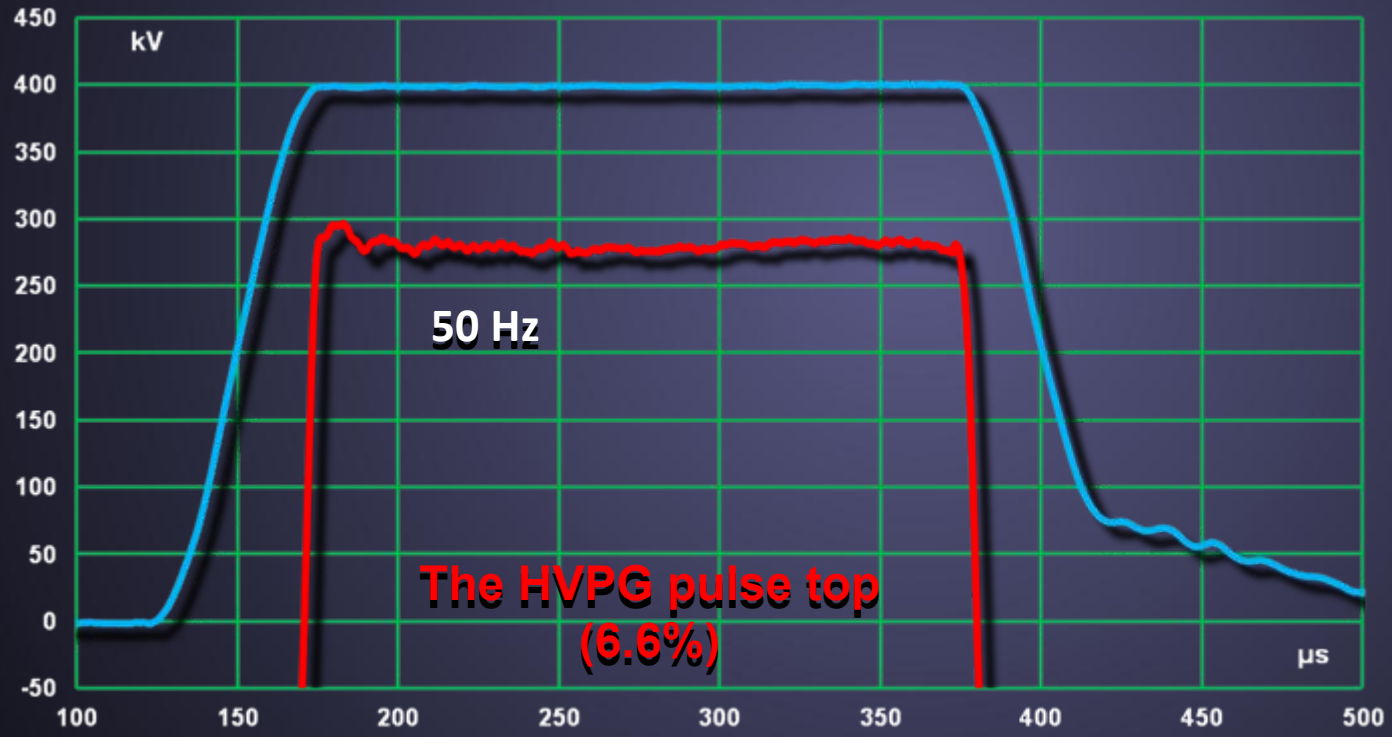
System of beam formation and preliminary acceleration (400keV) /Accelerating tube/



The high-voltage pulse generator (HVPG)

The high-voltage pulse generator (HVPG)

400kV



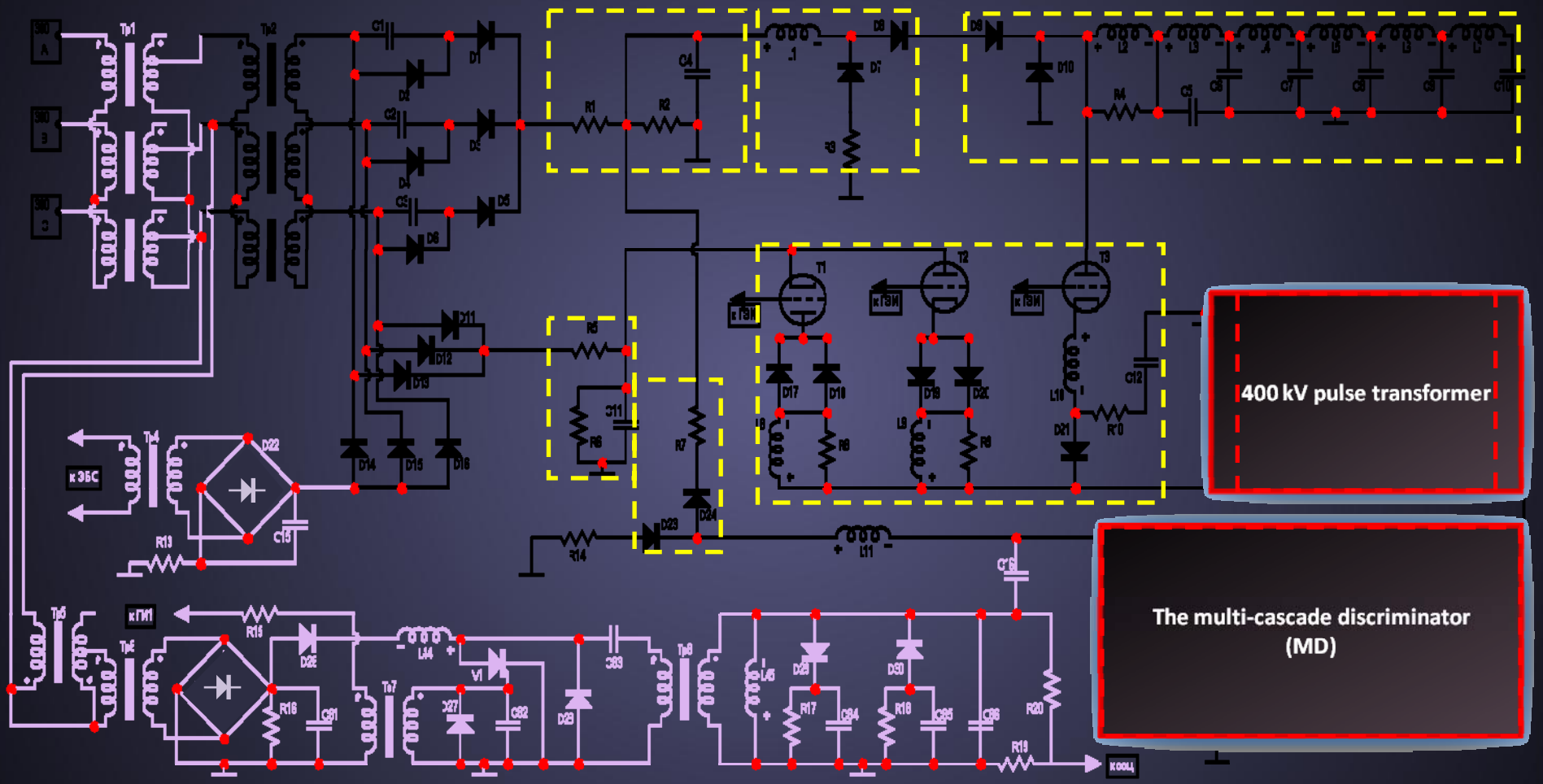
The HVPG pulse

The high-voltage pulse generator (HVPG)

400kV

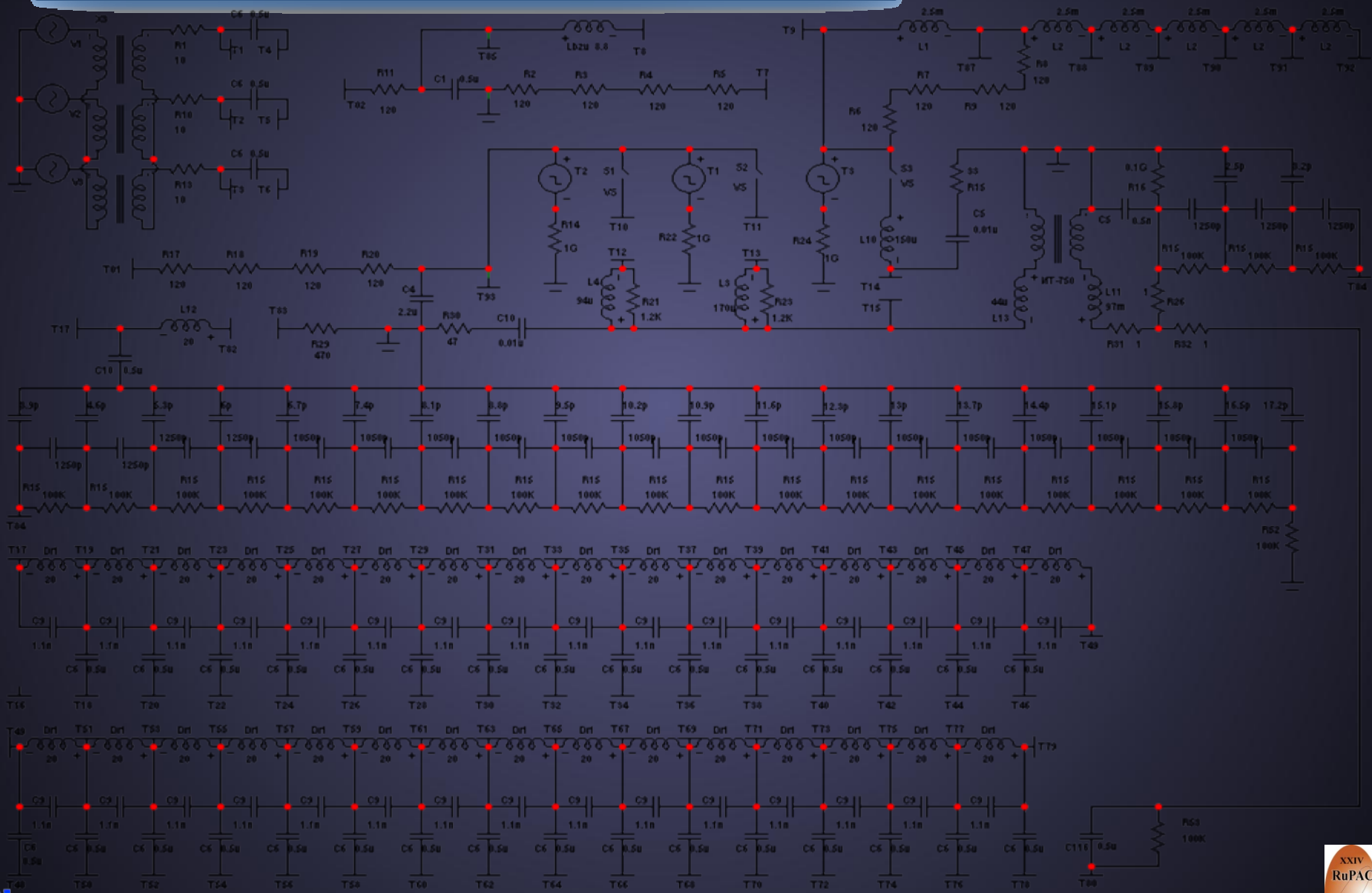
The HVPG pulse top (6.6%)

The HVPG schematic diagram

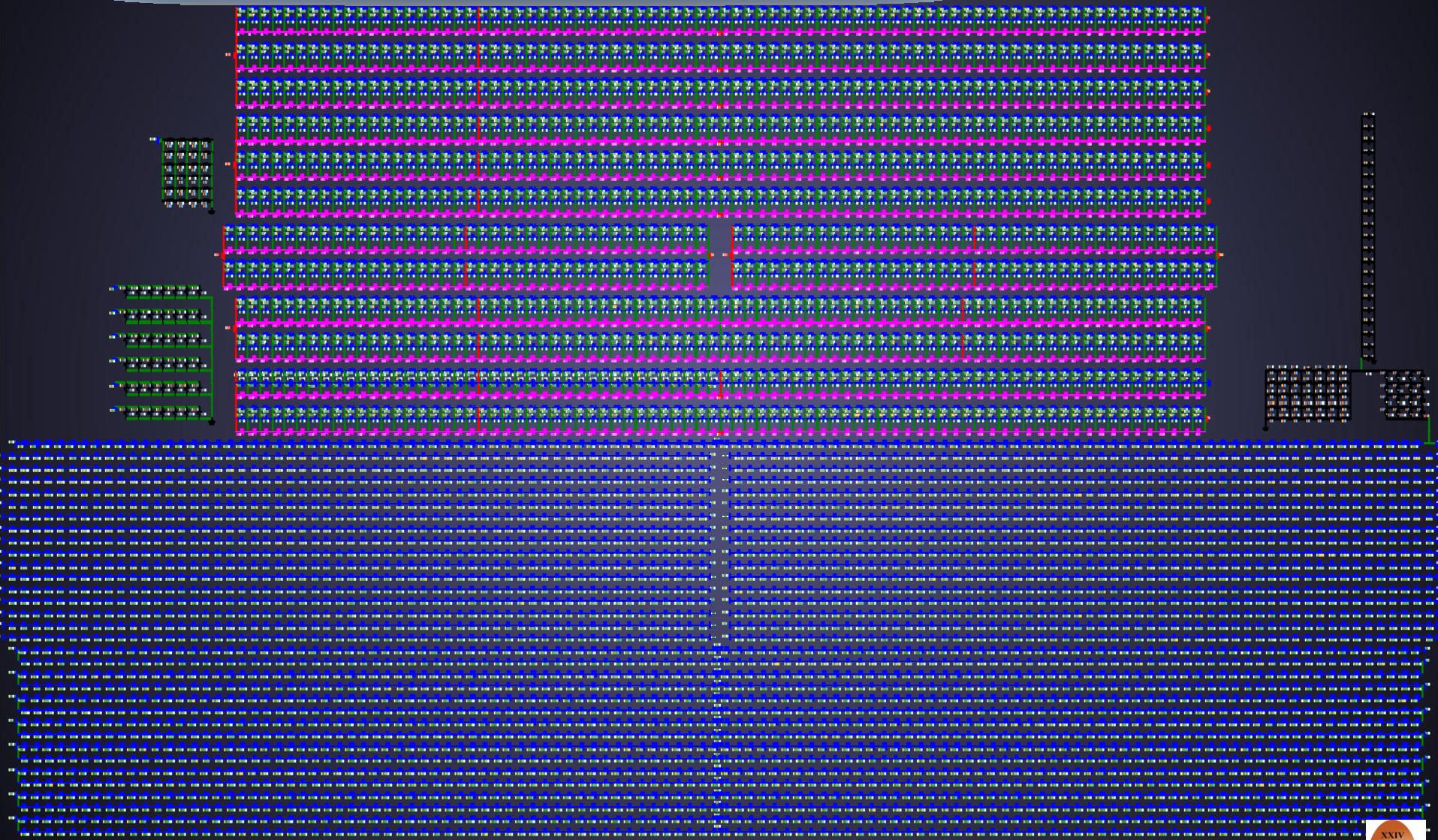


The HVPG
400kV equipment

The HVPG model (page 1)

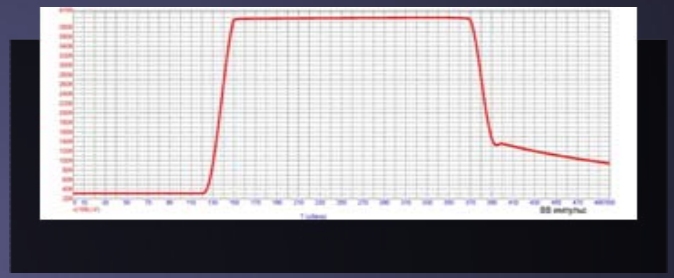


The HVPG model (page 2)

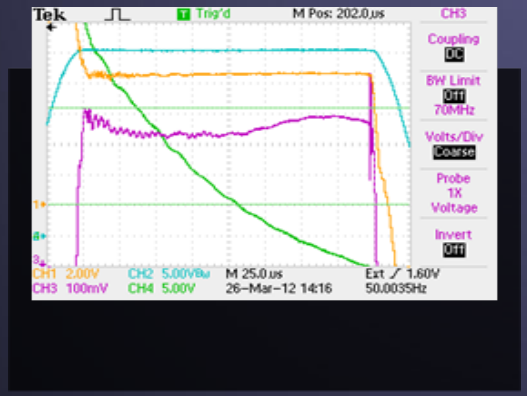


The HVPG model

Comparison of the measured data with the model calculations



The HVPG pulse (nominal regime)



The HVPG pulse top

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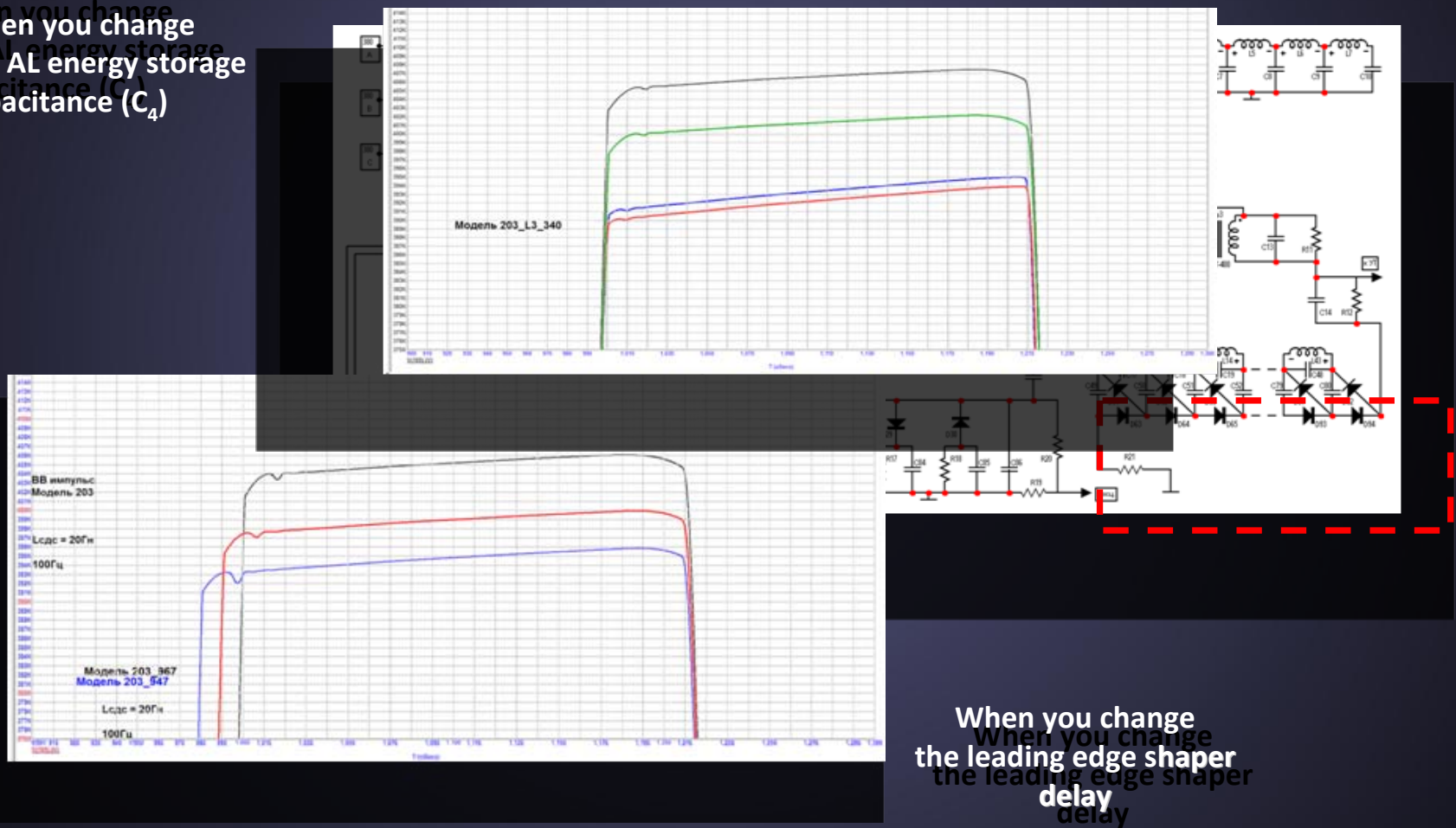
The HVPG model

100 Hz

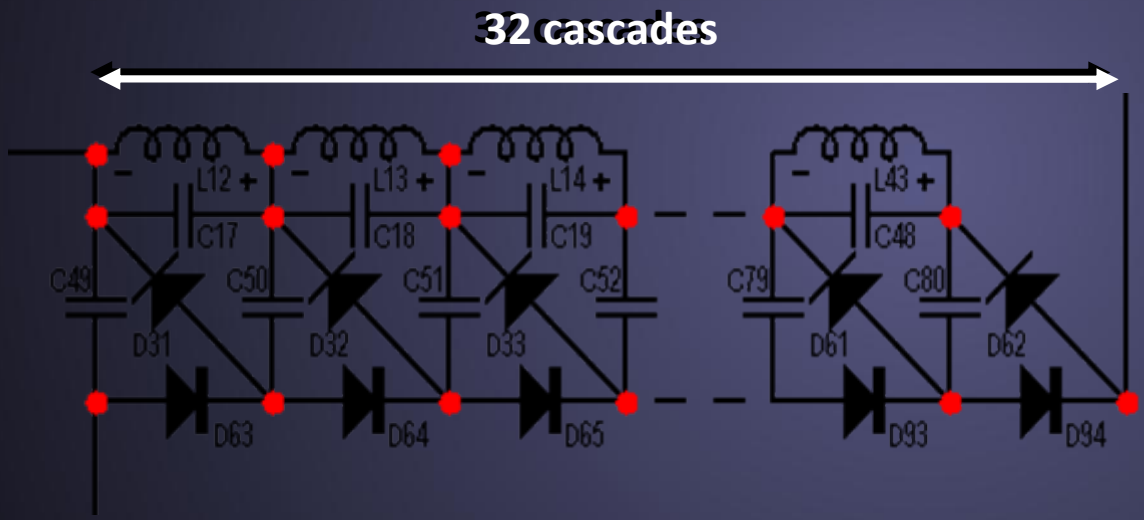
When you change the AL energy storage capacitance (C_4)

Effects of the leading edge shaper delay and the AL energy storage capacitance



When you change the leading edge shaper delay

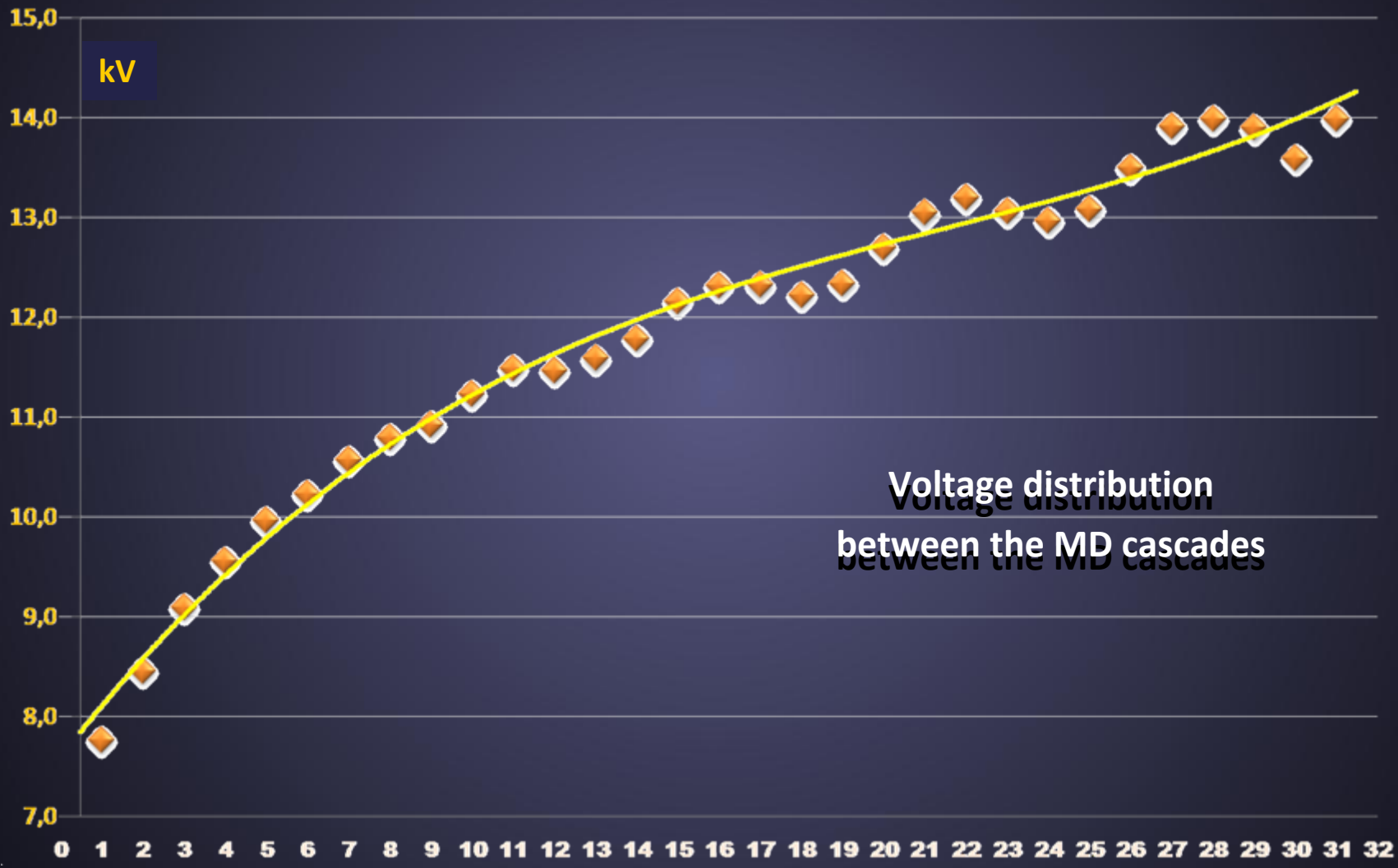
The HVPG
multi-cascade discriminator (MD)



The HVPG development – NIIEFA, St. Petersburg (1970's)

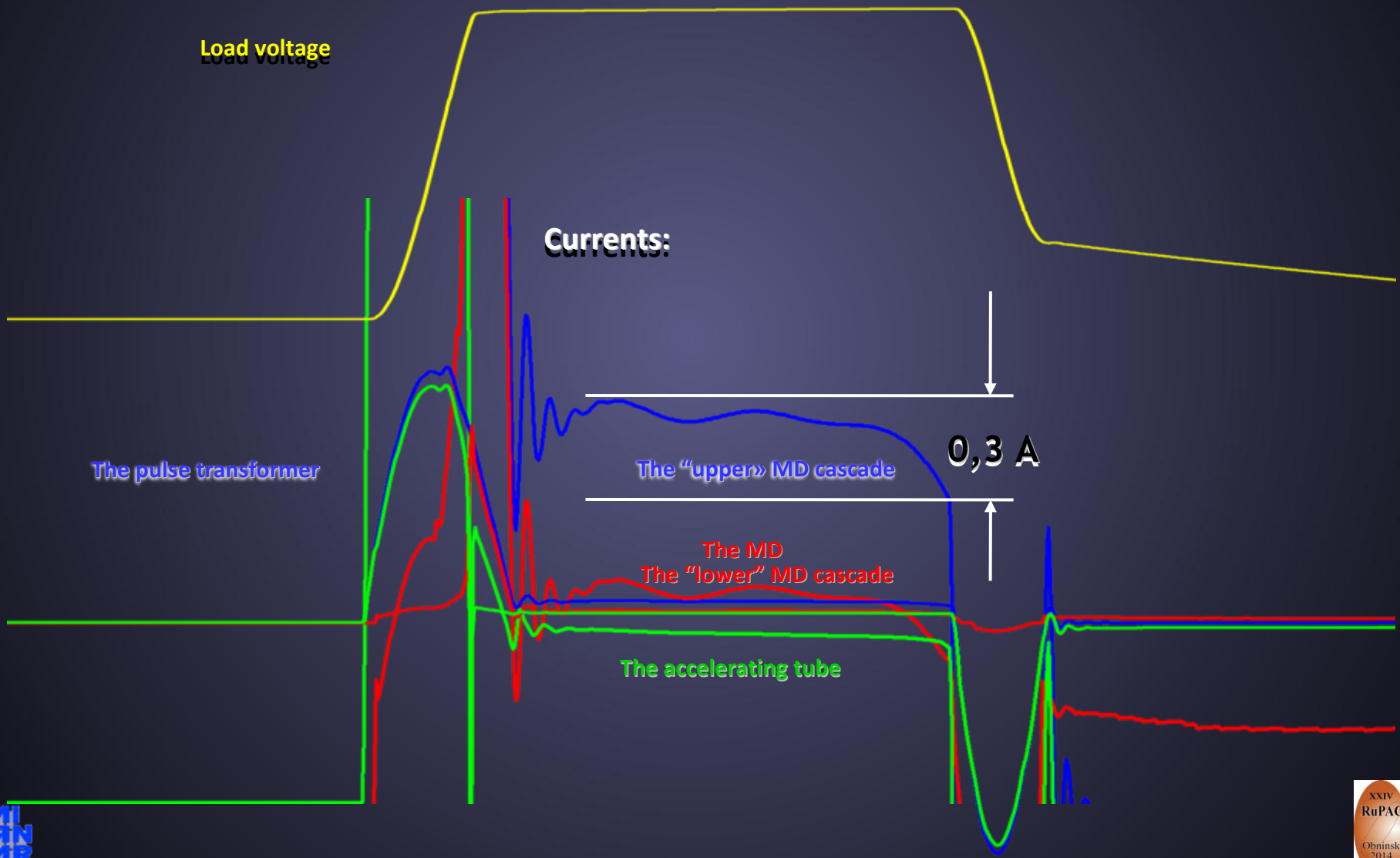
The HVPG model

100 Hz



Voltage distribution between the MD cascades

The HVPG model



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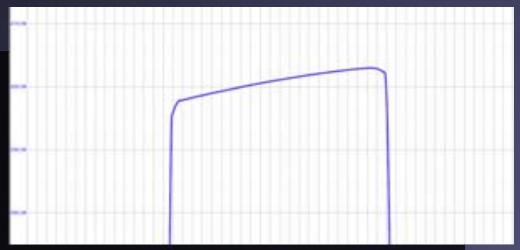
The HVPG model

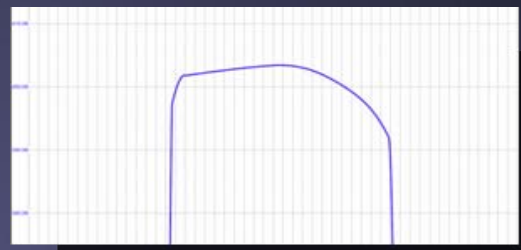
50 Hz

7 H

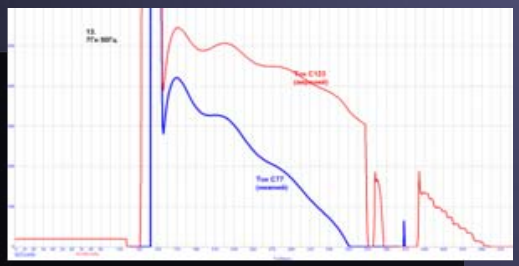
100 Hz



The HVPG pulse top



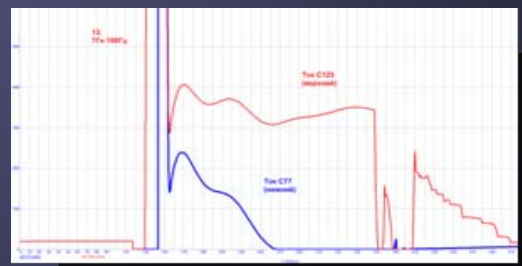
7 H



The MD capacitors currents

The upper cascade

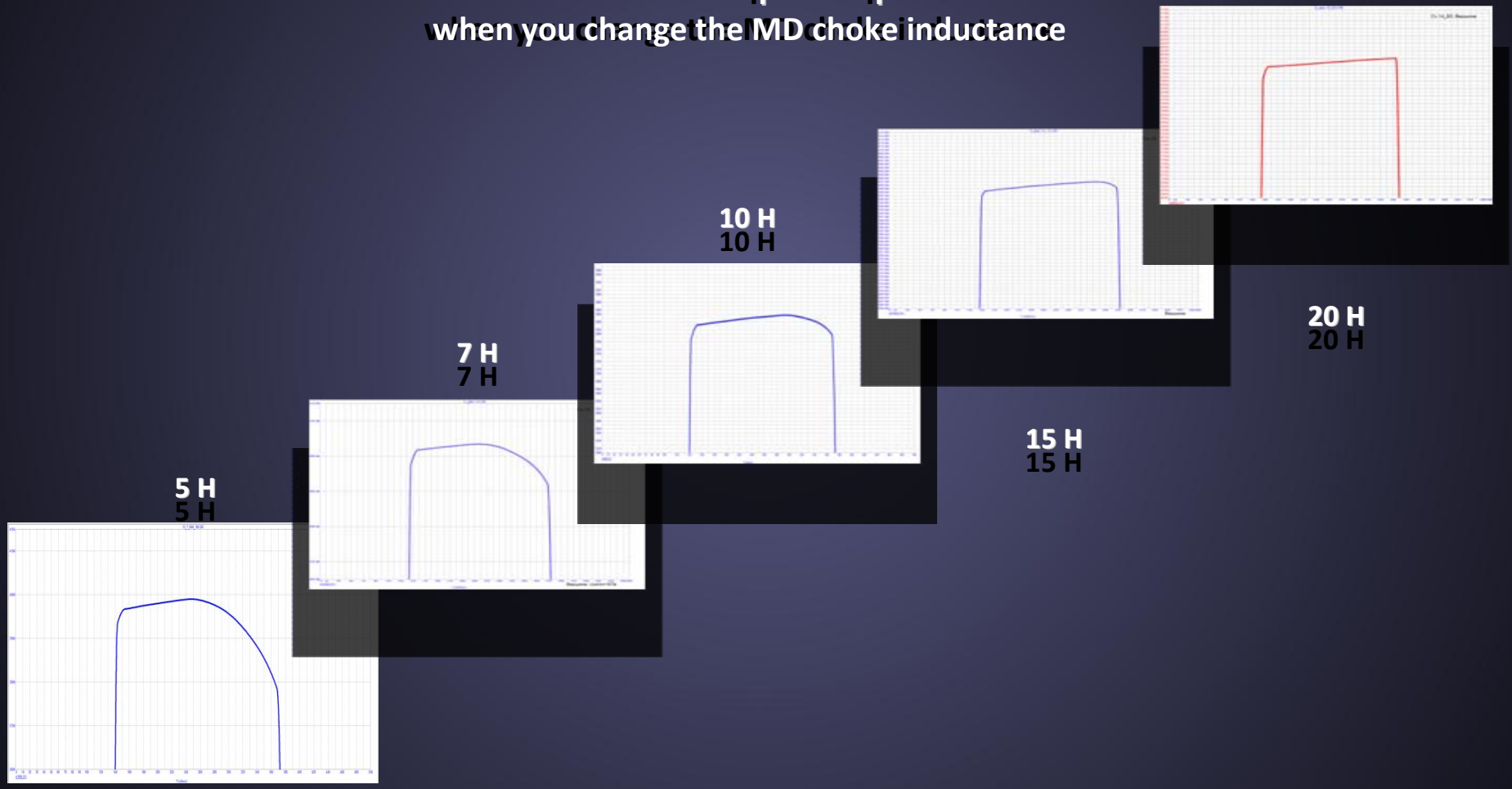
The lower cascade



The HVPG model

100 Hz

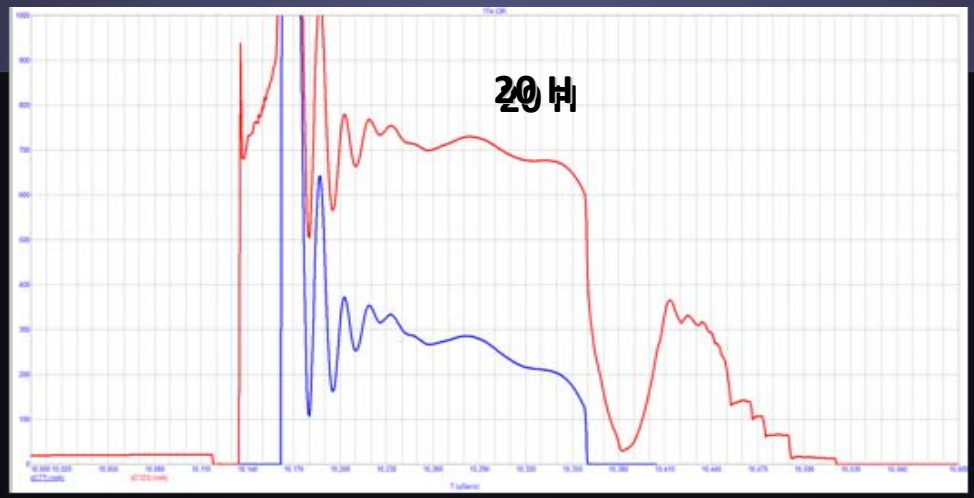
The HVPG pulse top
when you change the MD choke inductance



The HVPG model

100 Hz

The MD capacitors currents



The MD section

Two cascades

Test results

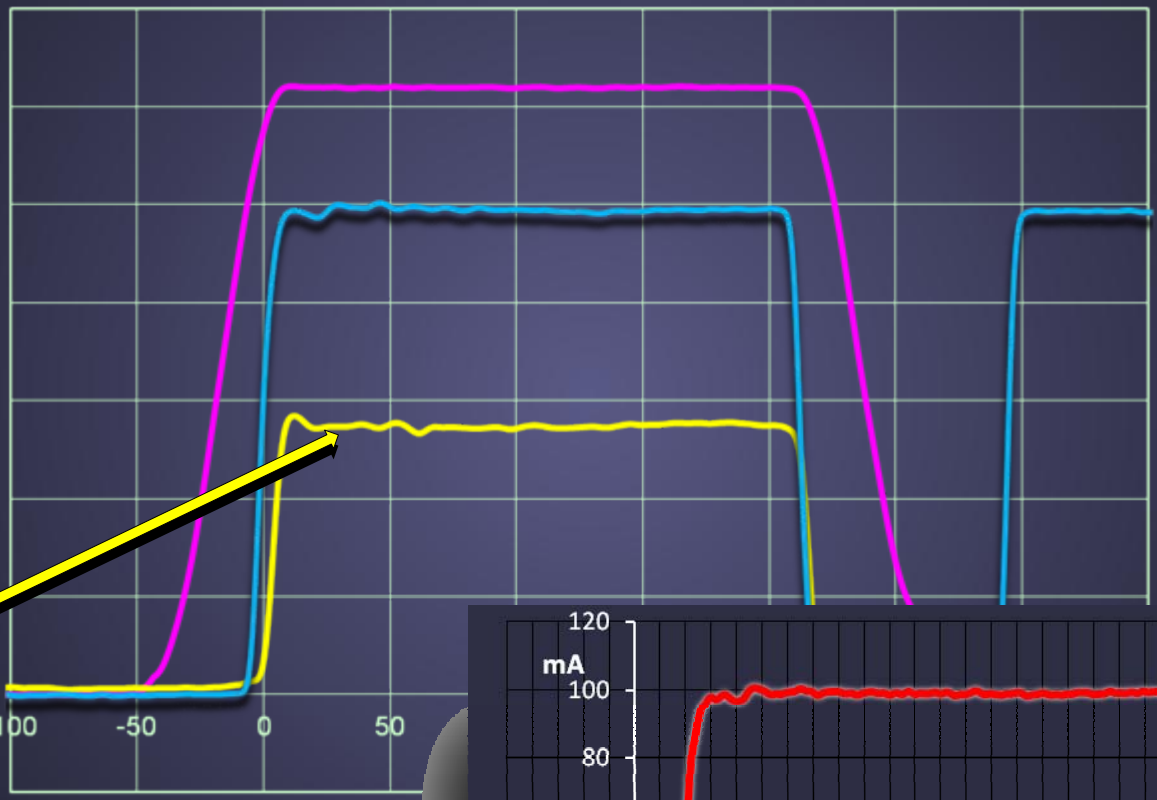
100 Hz

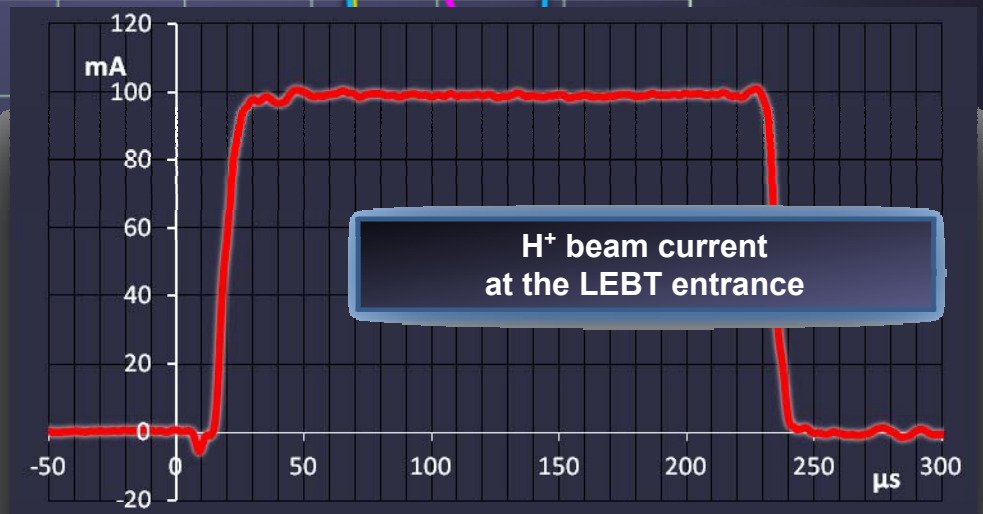
The HVPG pulse (400 kV)

The injector exit beam current (100 mA)

The HVPG pulse top (6.6%)

Instability - - less than ±0,1%





Thank you for your attention