Microsecond Pulsed Glow Discharge as radiation and ion source for analytical applications

M. Voronov
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15. Deutsches Anwendertreffen
„Analytische Glimmentladungs-Spektrometrie“
23.-24. November 2011
IFW Dresden

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- Model of PGD
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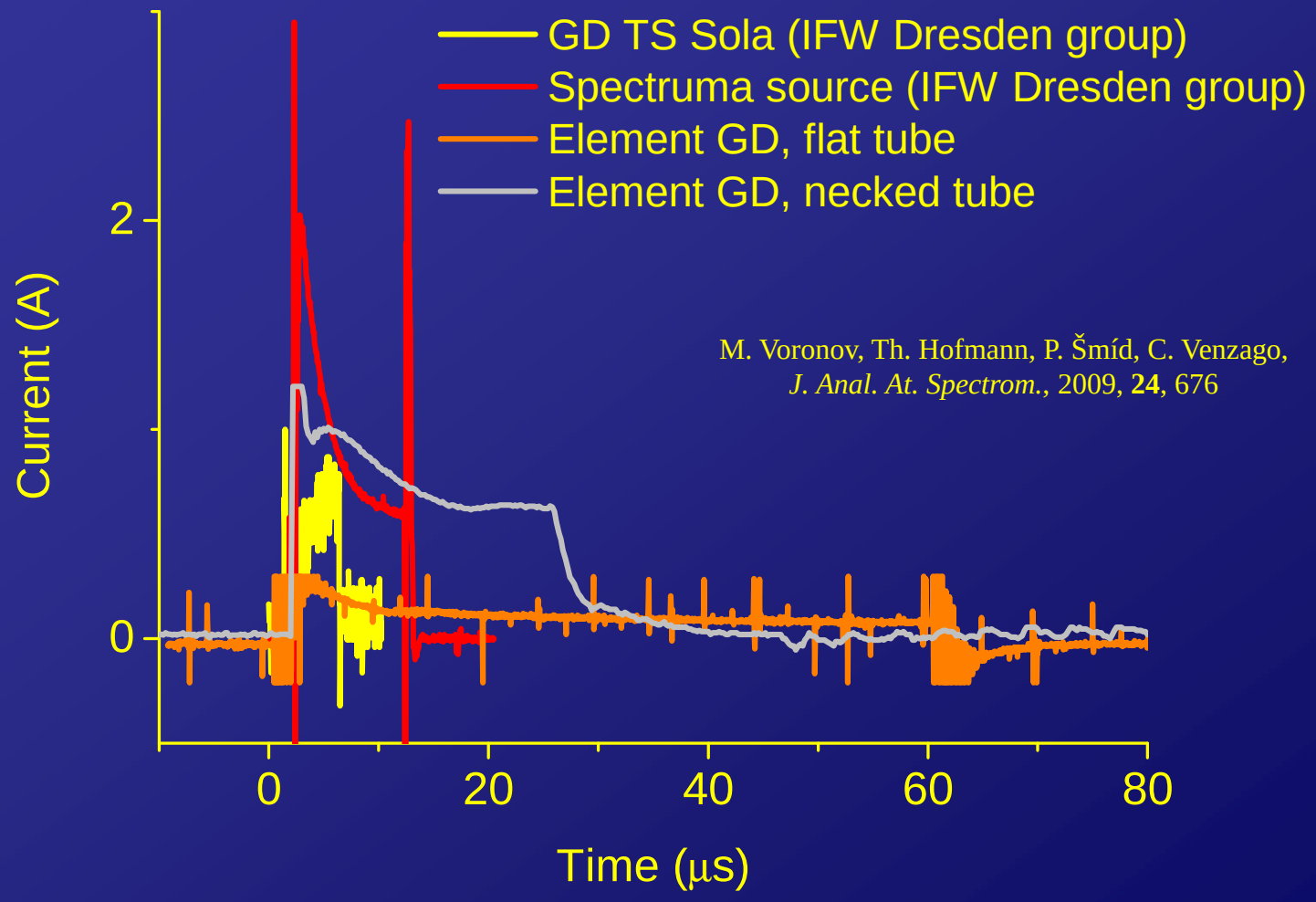
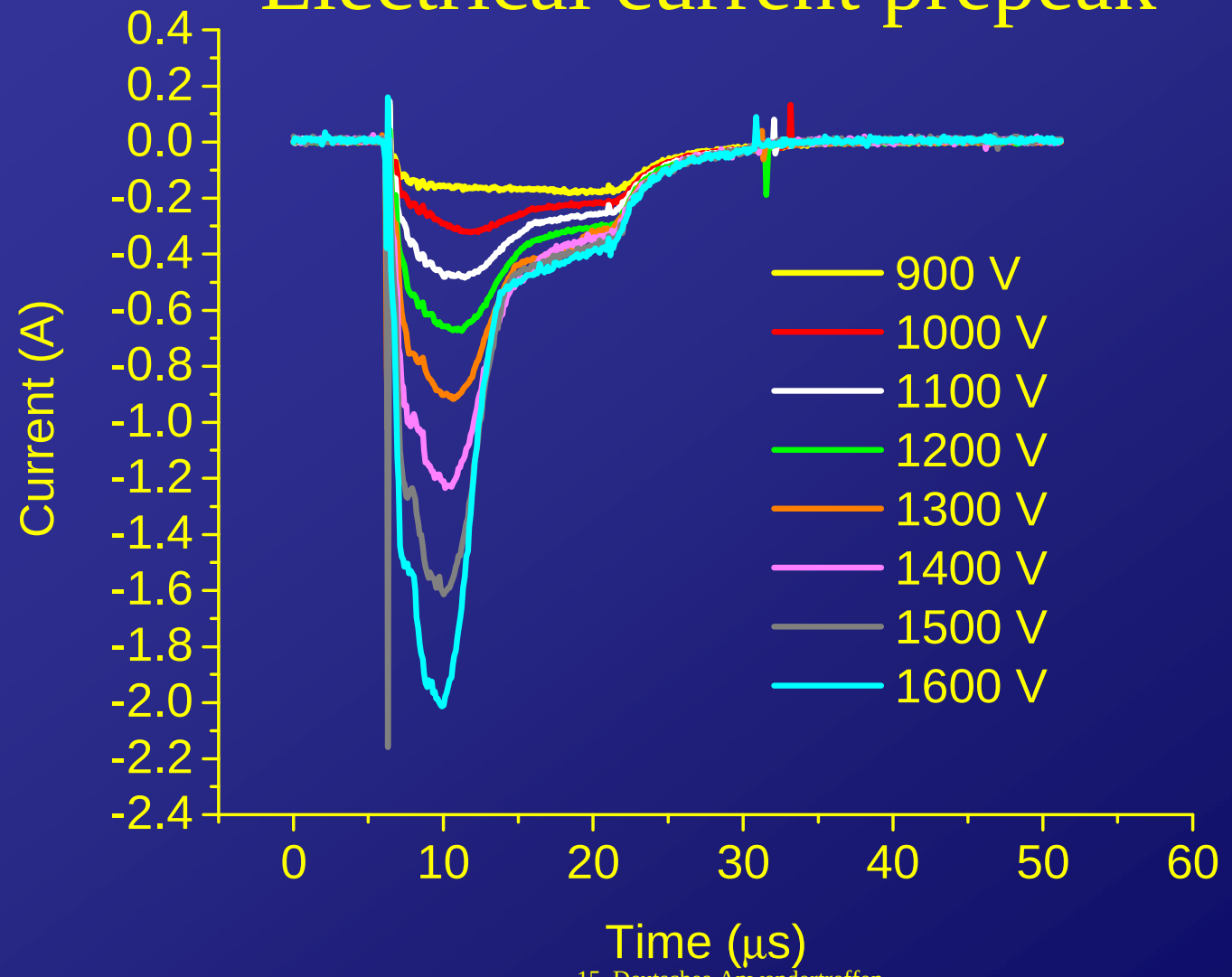
Electrical current prepeak



M. Voronov, Th. Hofmann, P. Šmíd, C. Venzago,
J. Anal. At. Spectrom., 2009, **24**, 676

Electrical current prepeak



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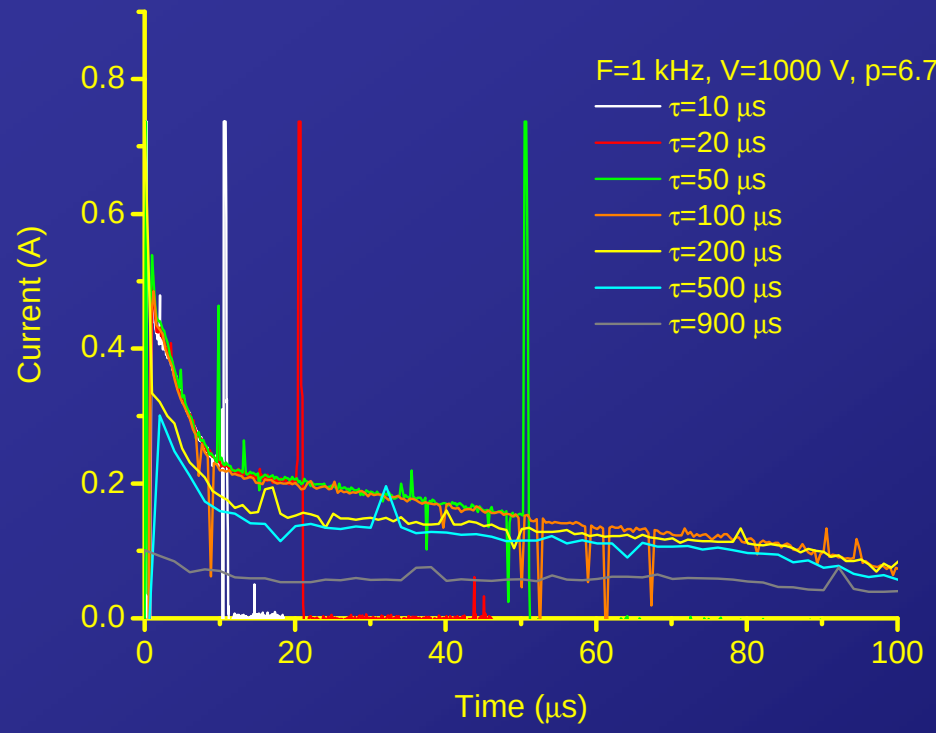
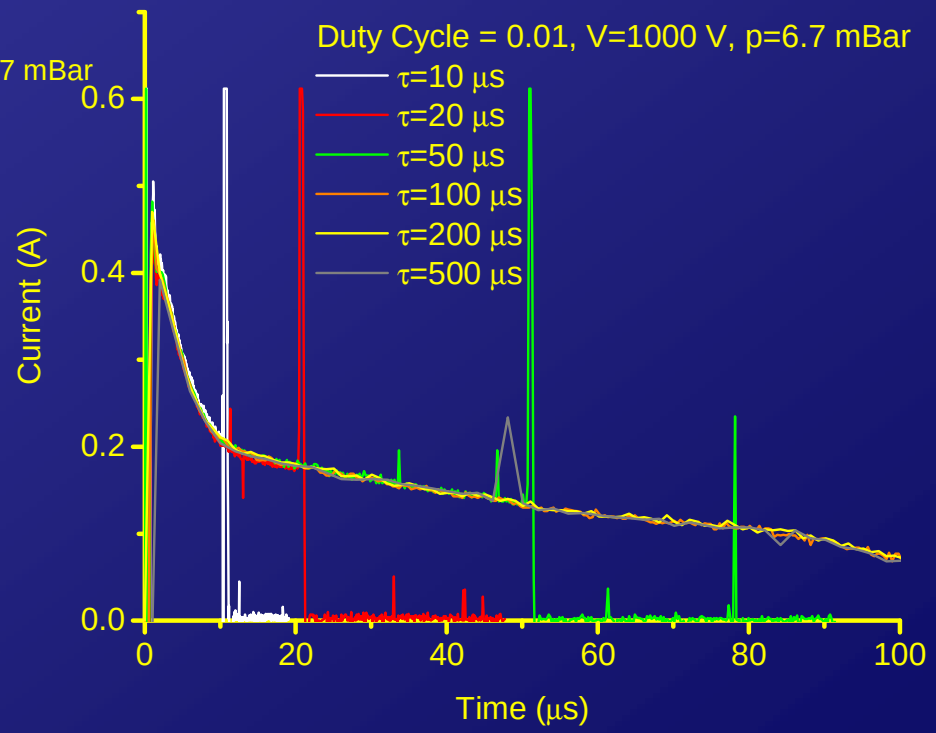
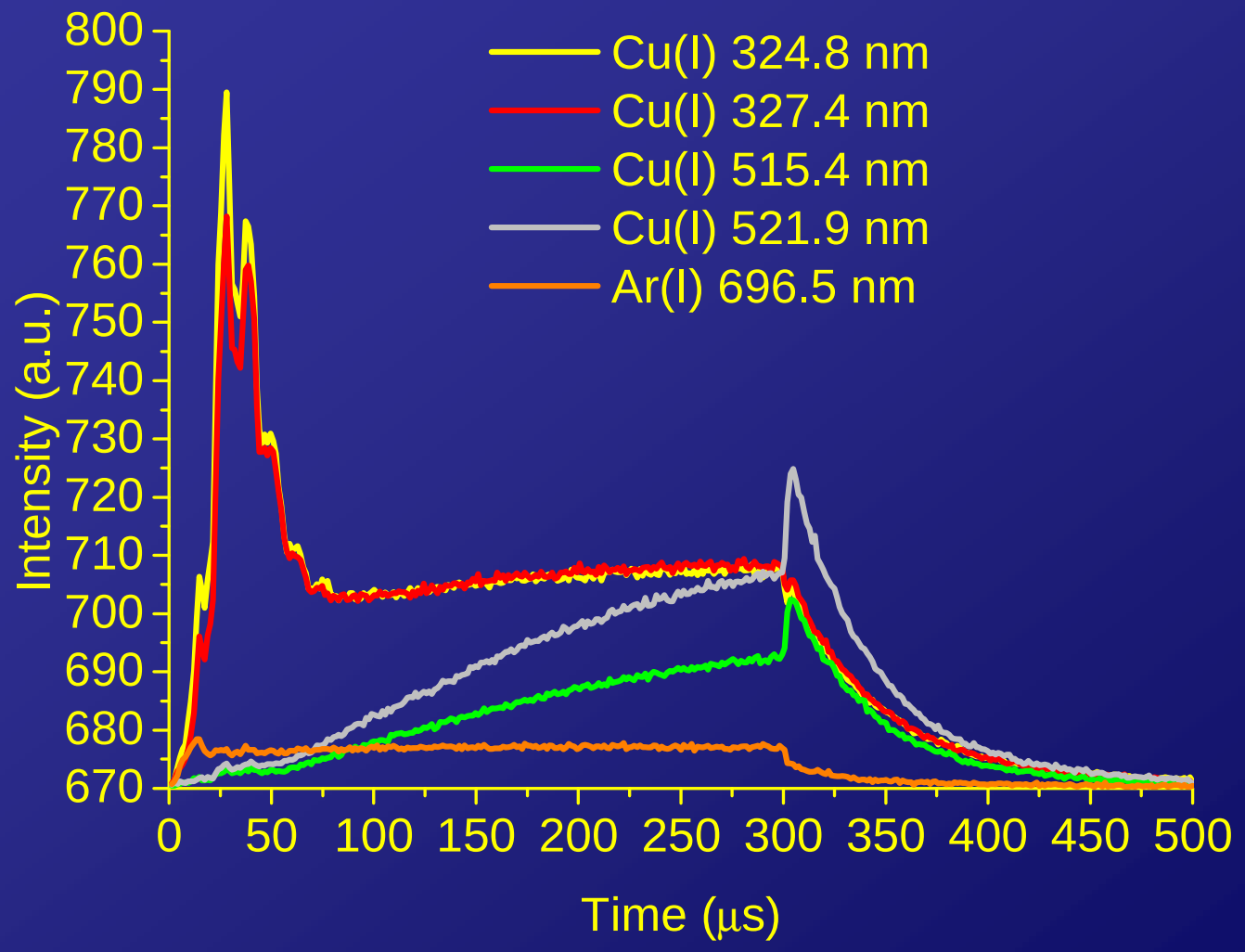


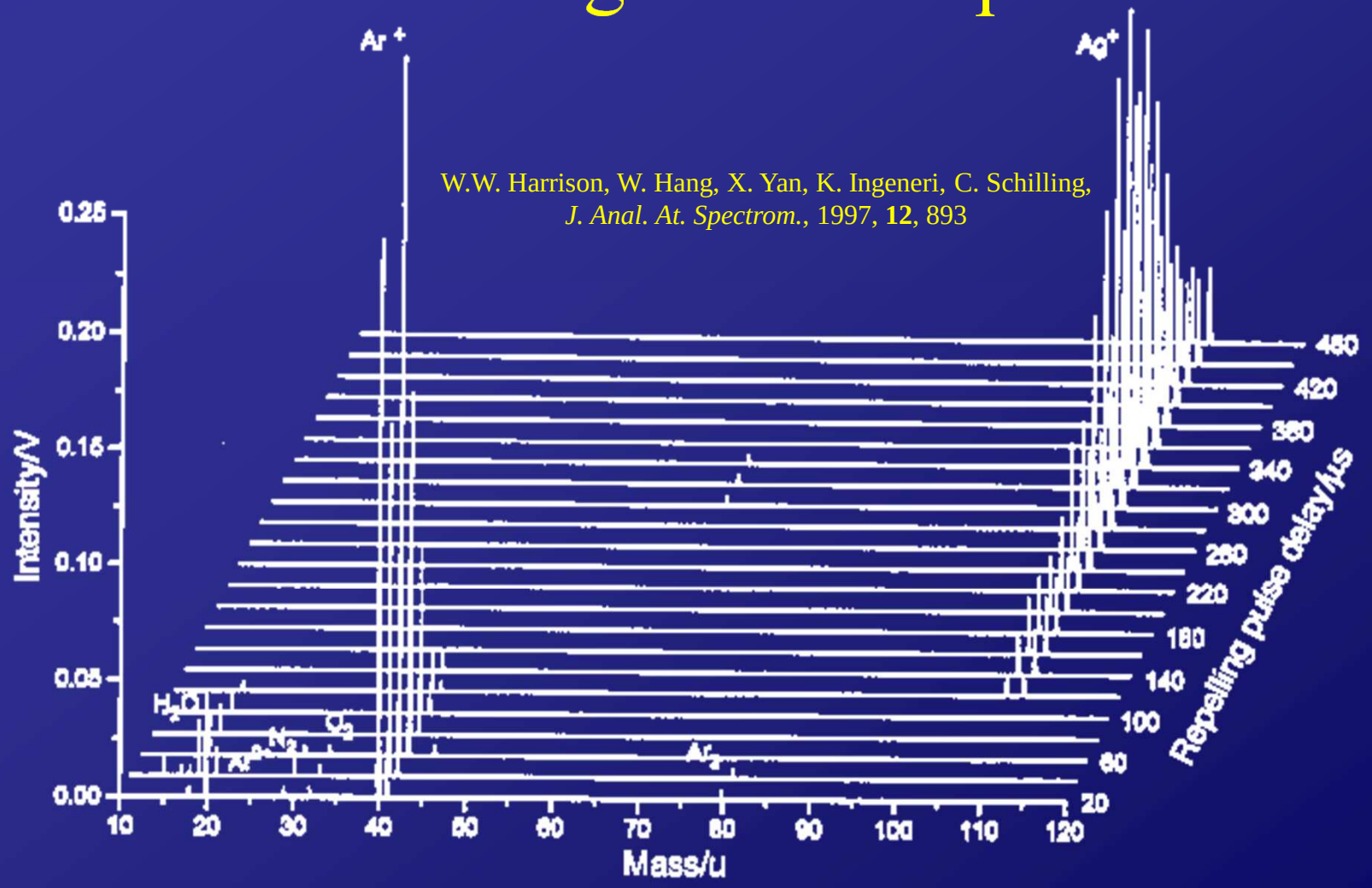


V. Hoffmann, V.V. Efimova, M.V. Voronov, P. Smid, E.B.M. Steers, J. Eckert,
Journal of Physics: Conference Series, 2008, **133**, 012017

Radiation prepeak and afterpeak

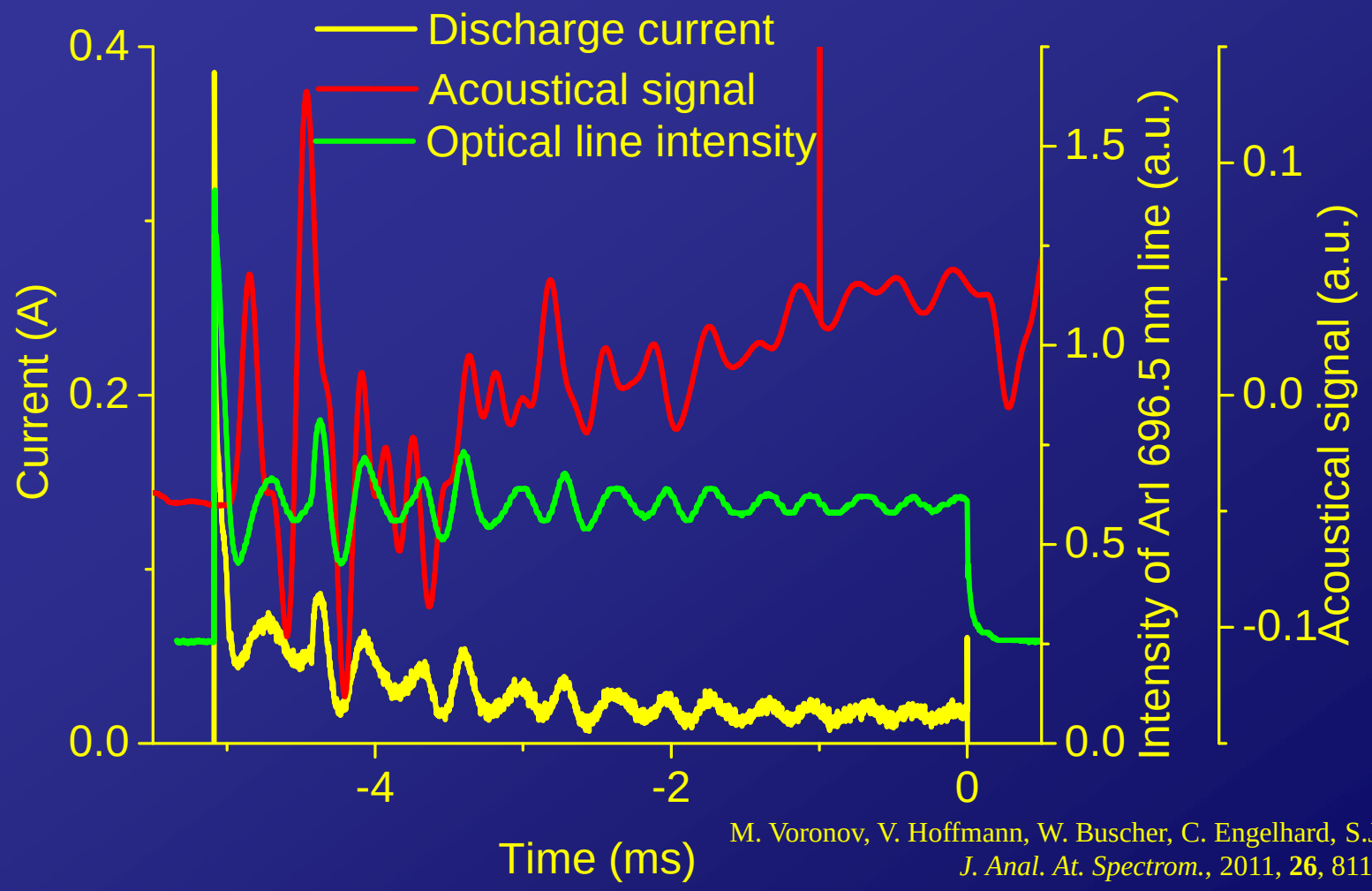


MS: afterglow and separation



W.W. Harrison, W. Hang, X. Yan, K. Ingeneri, C. Schilling,
J. Anal. At. Spectrom., 1997, **12**, 893

Pressure waves



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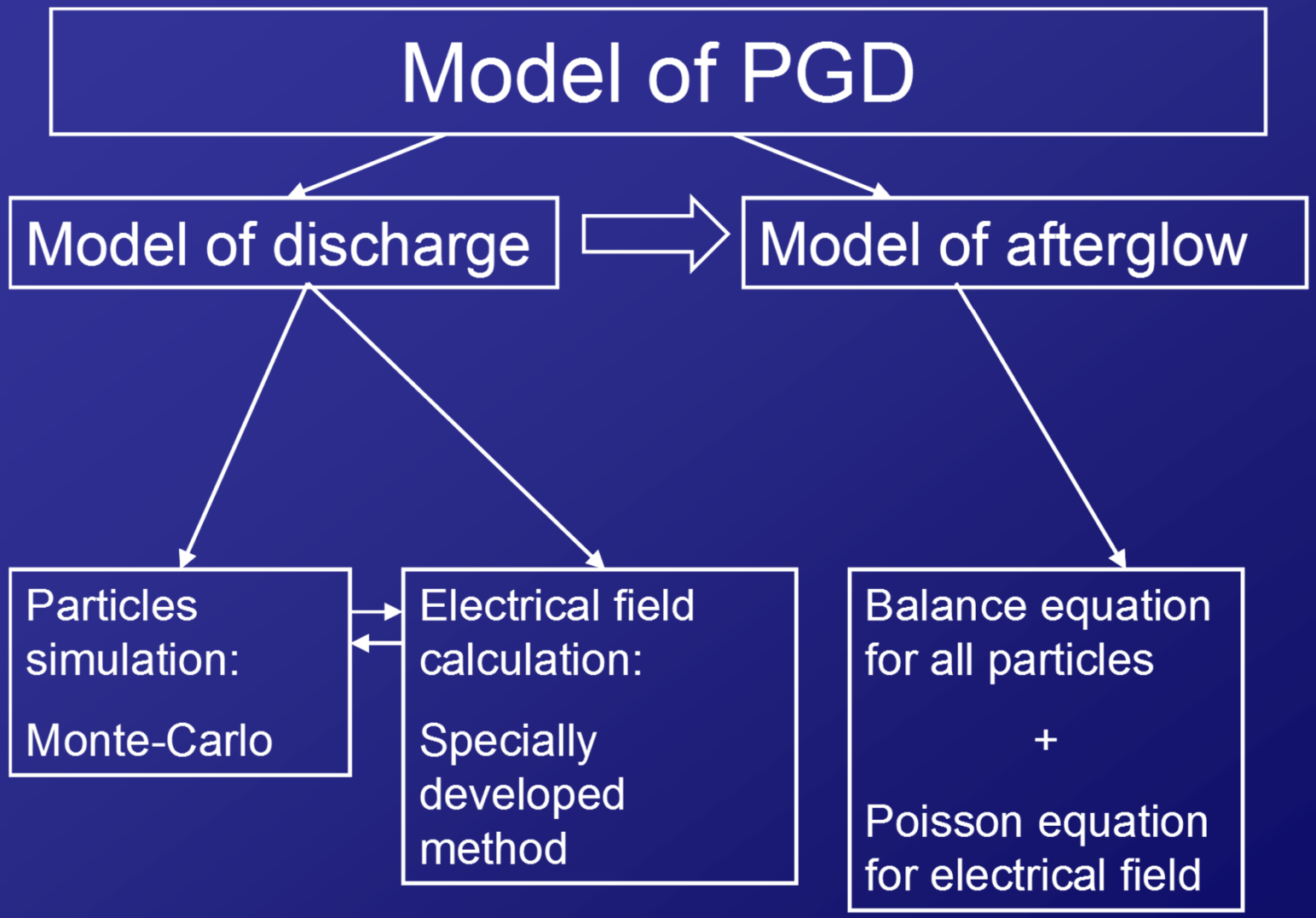
Model of PGD


Model of PGD
Model of discharge
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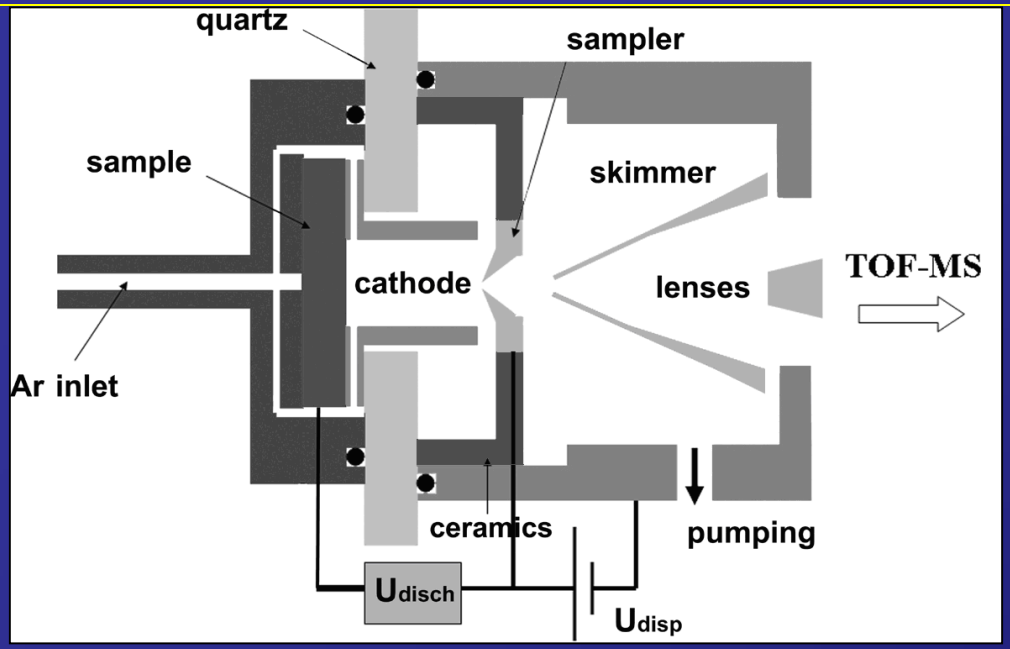
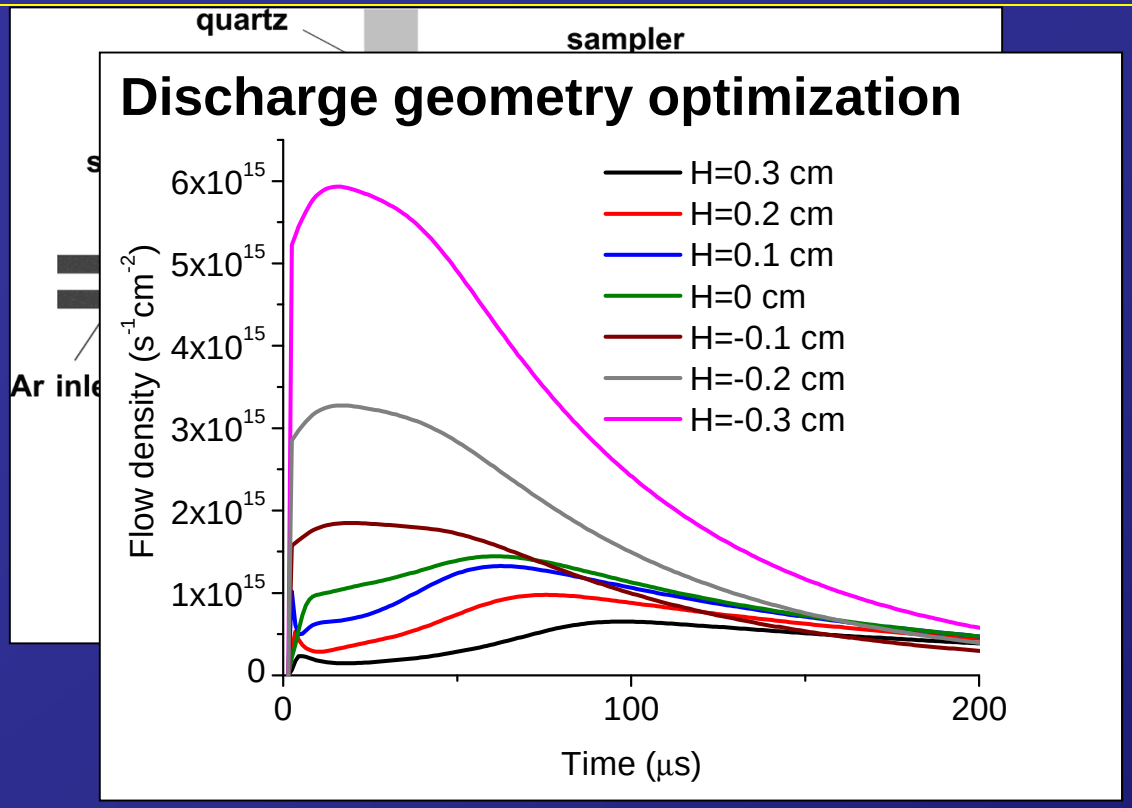
Electrical field calculation:
Specially developed method
Balance equation for all particles
+
Poisson equation for electrical field

Model applications



M. Voronov, A. Ganeev,
Spectrochimica Acta Part B, 2009, **64**, 416

Model applications



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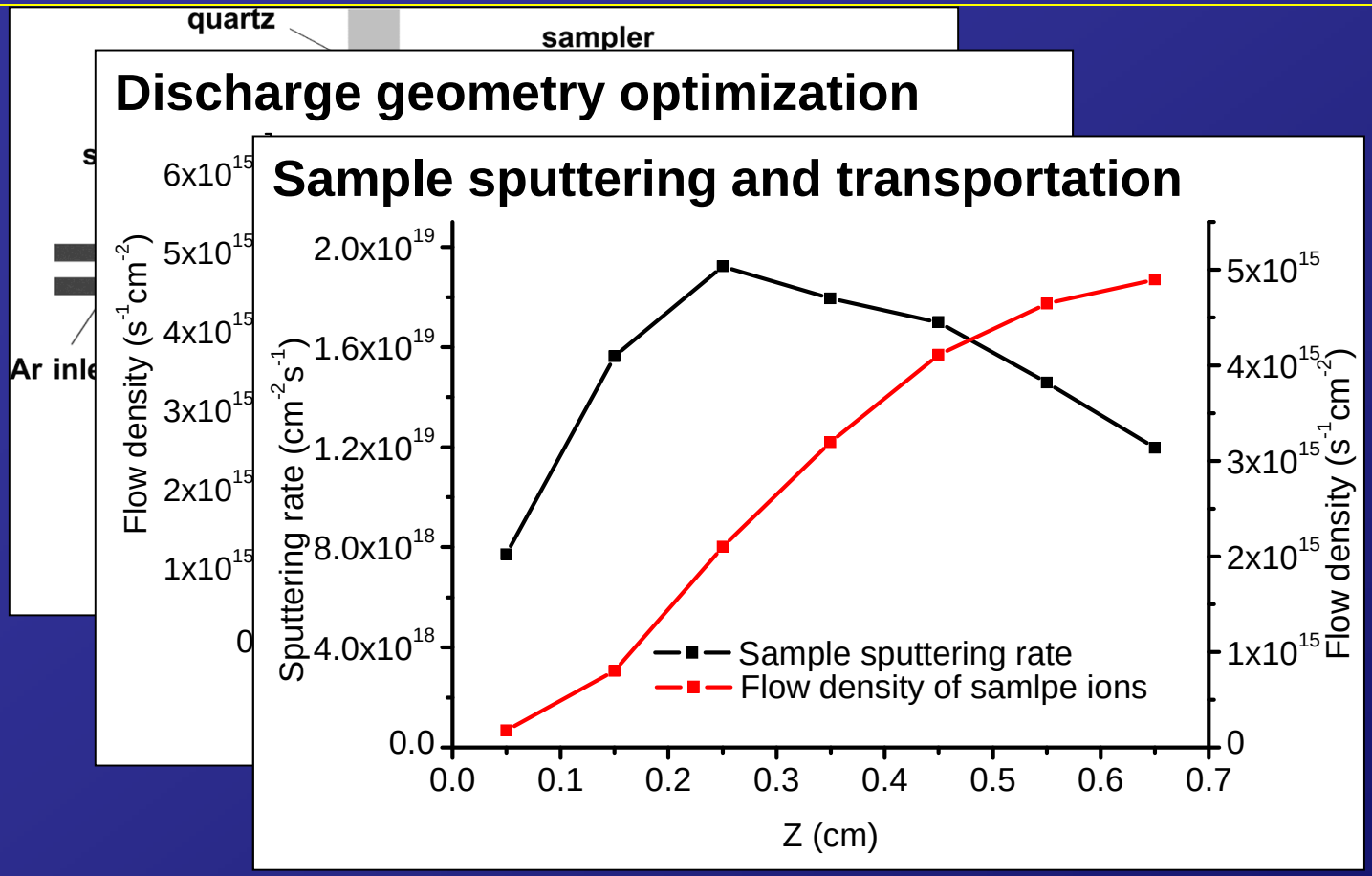

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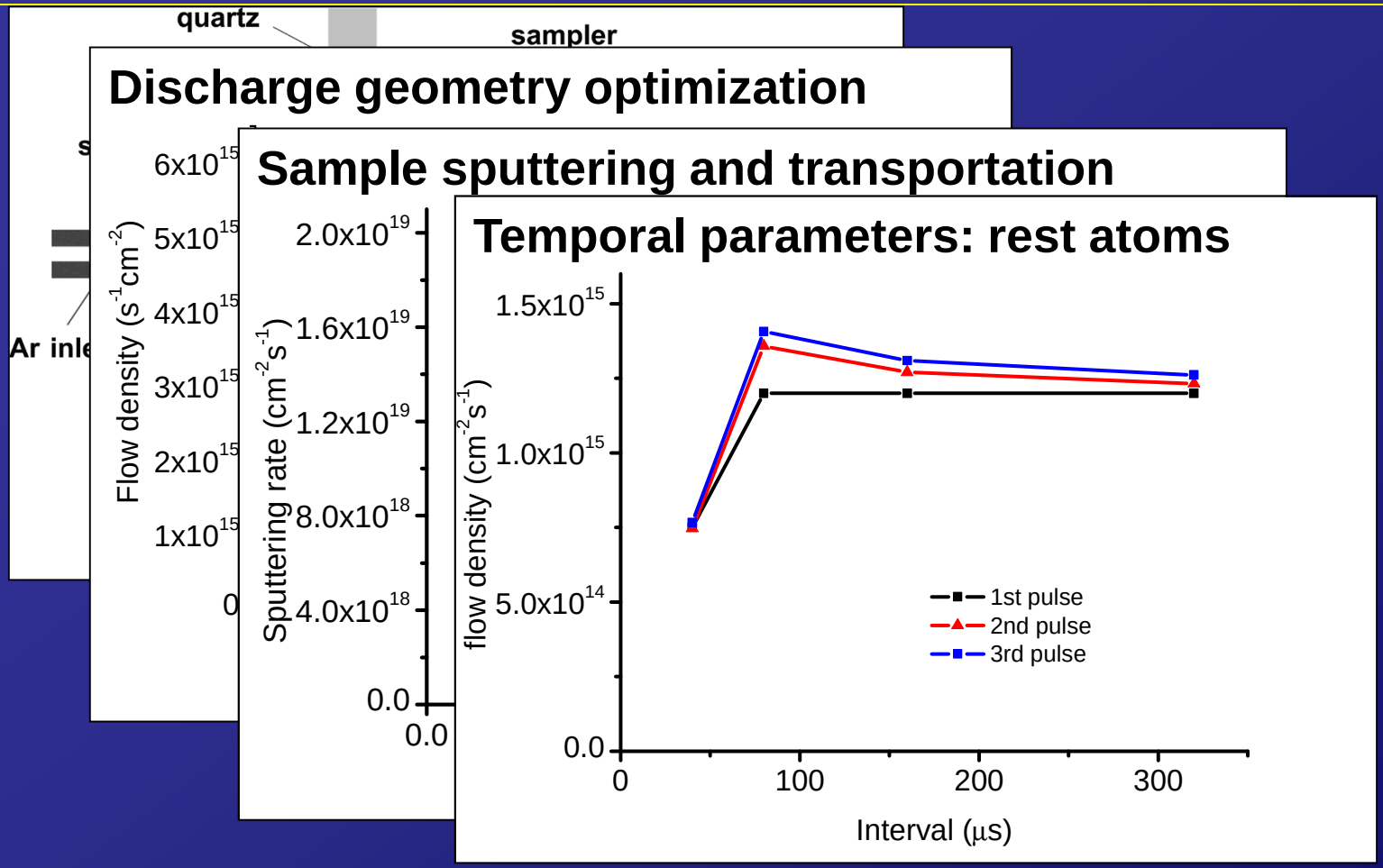

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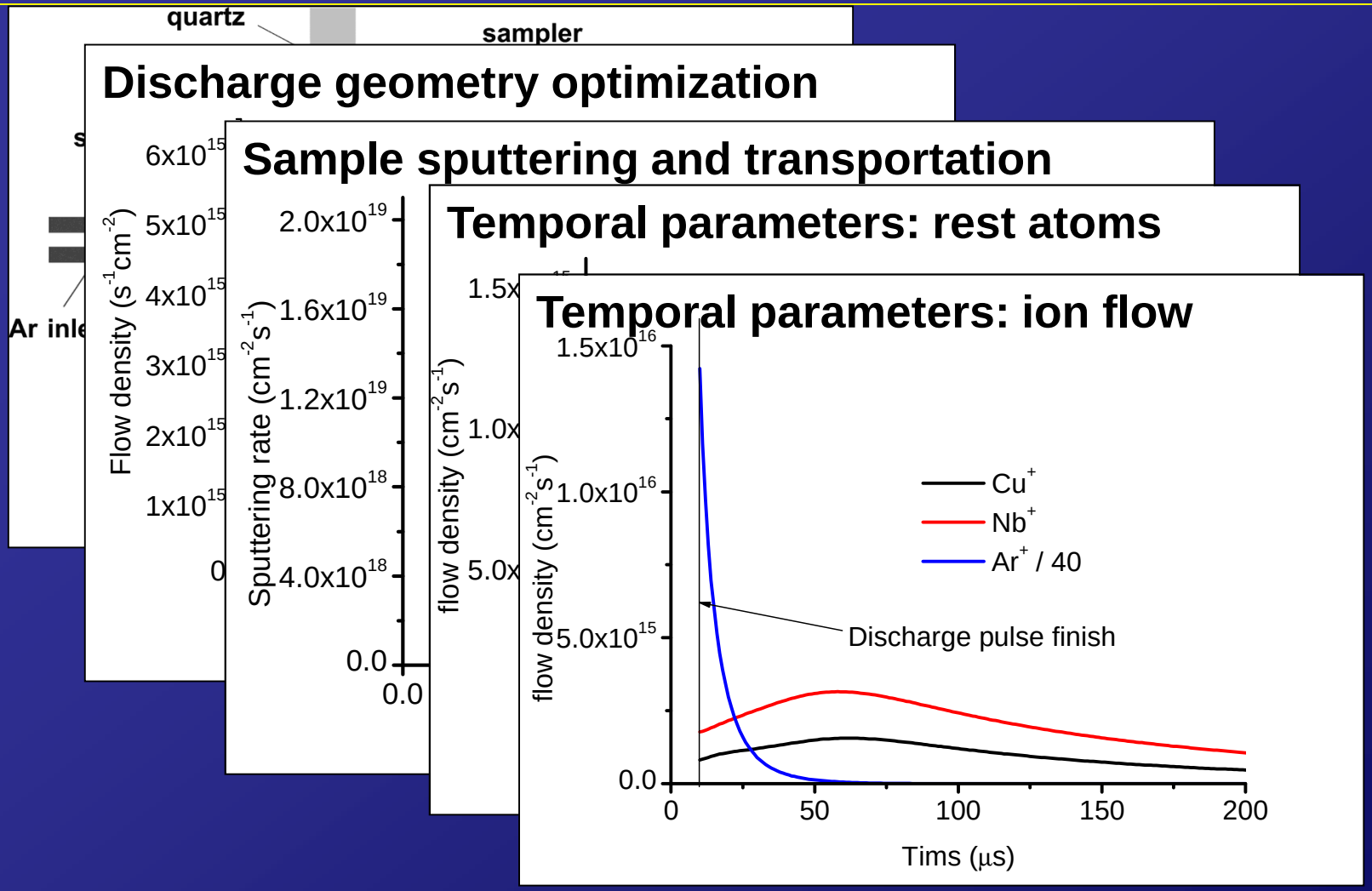

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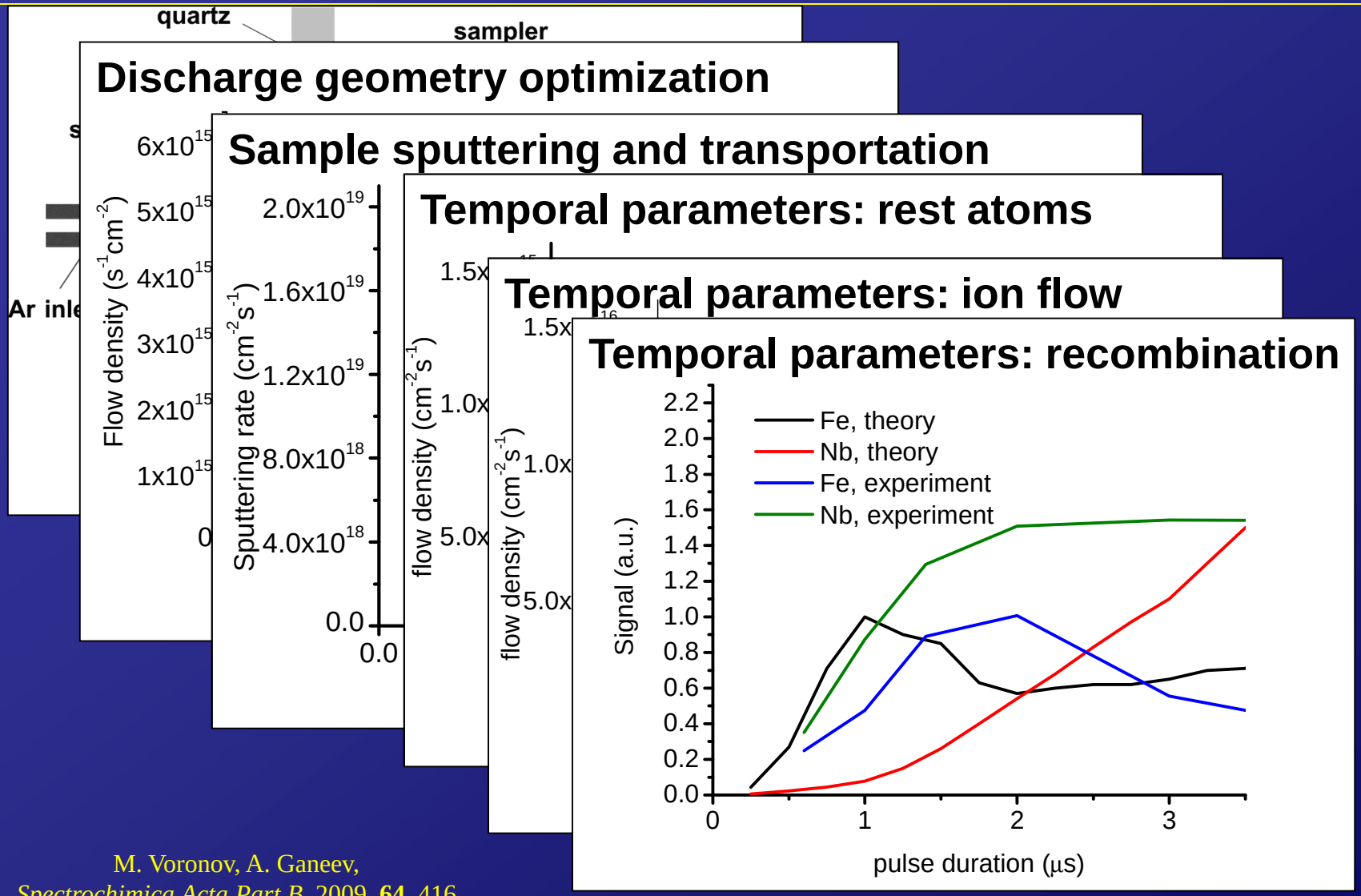

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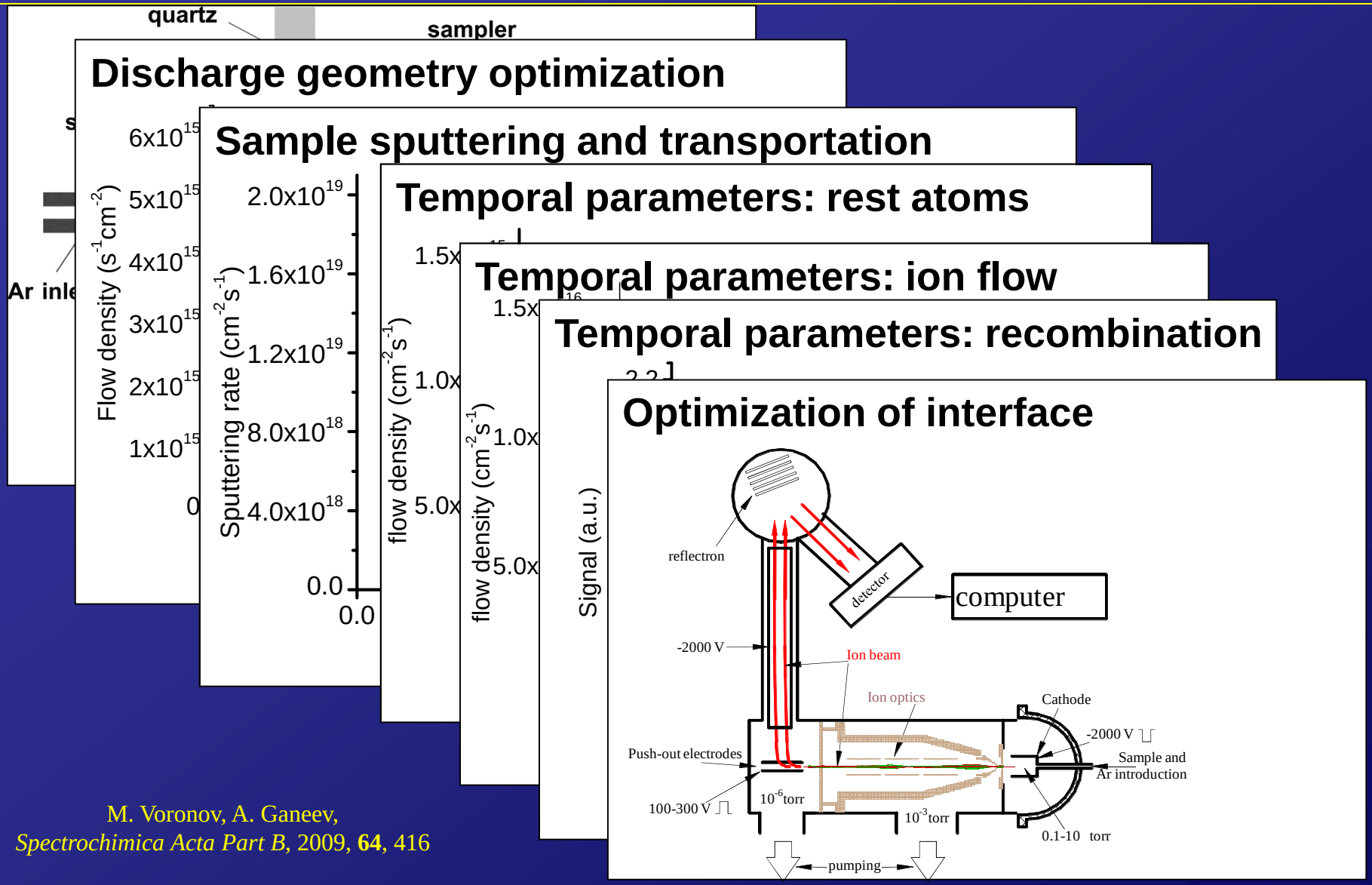

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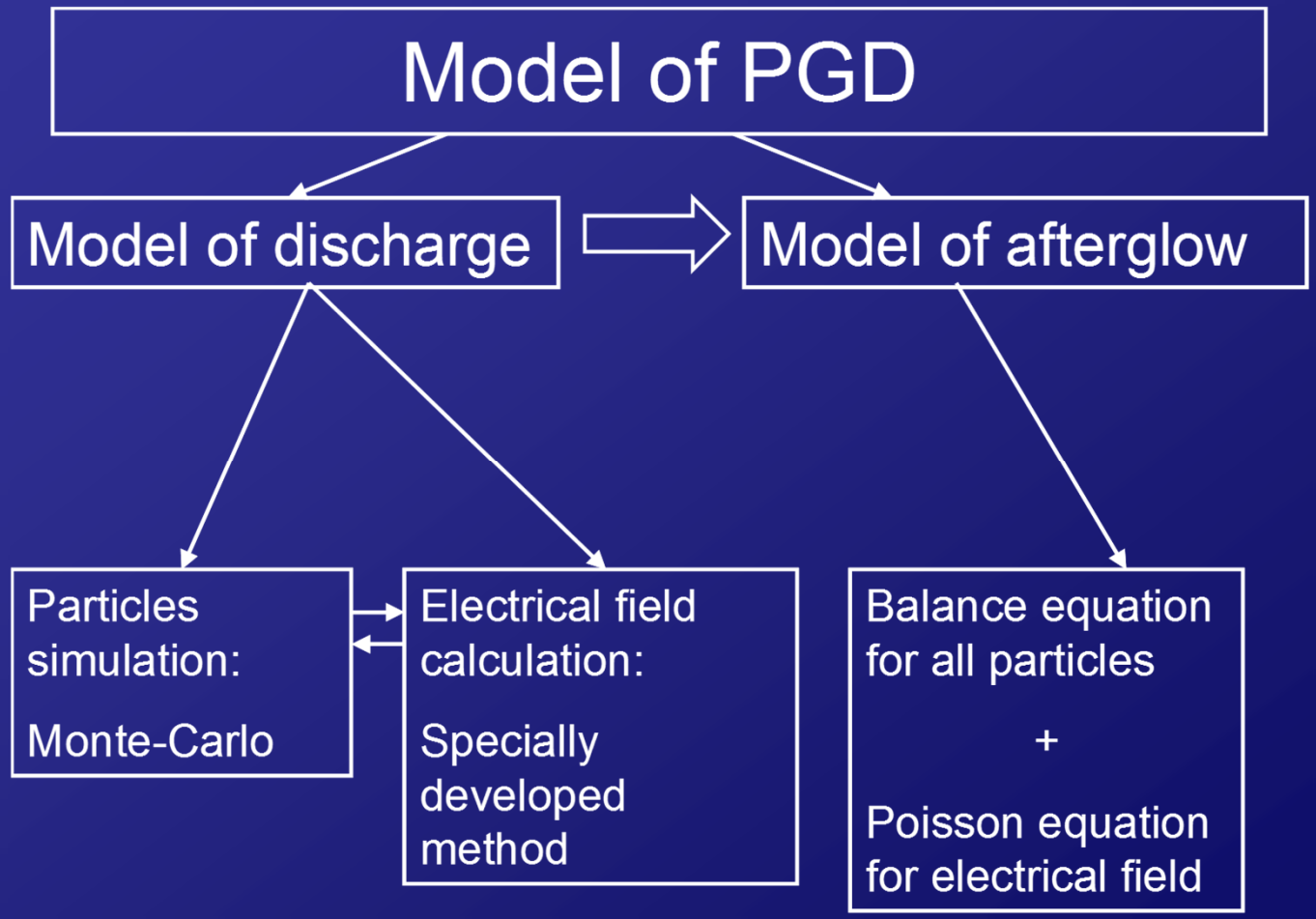
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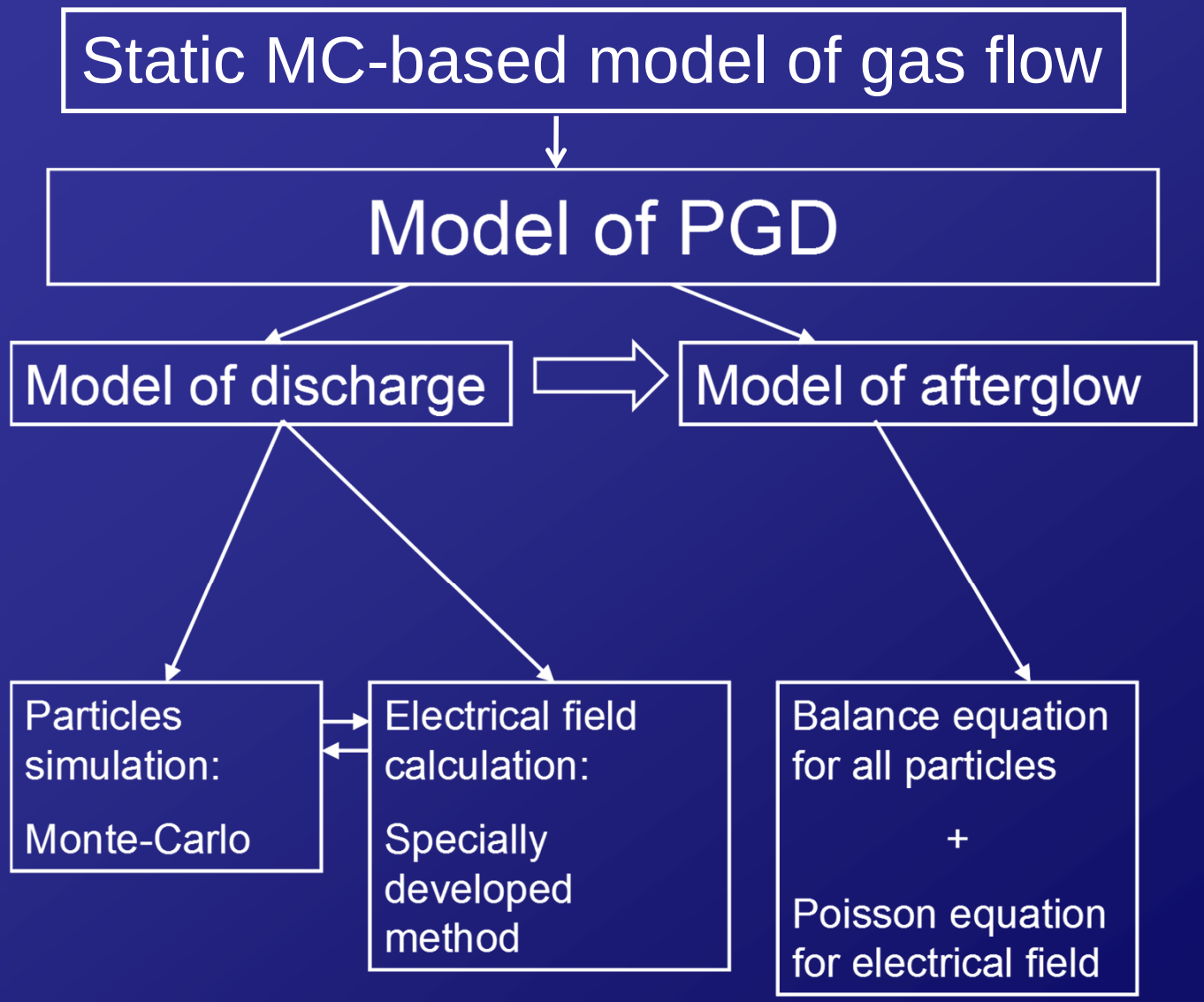
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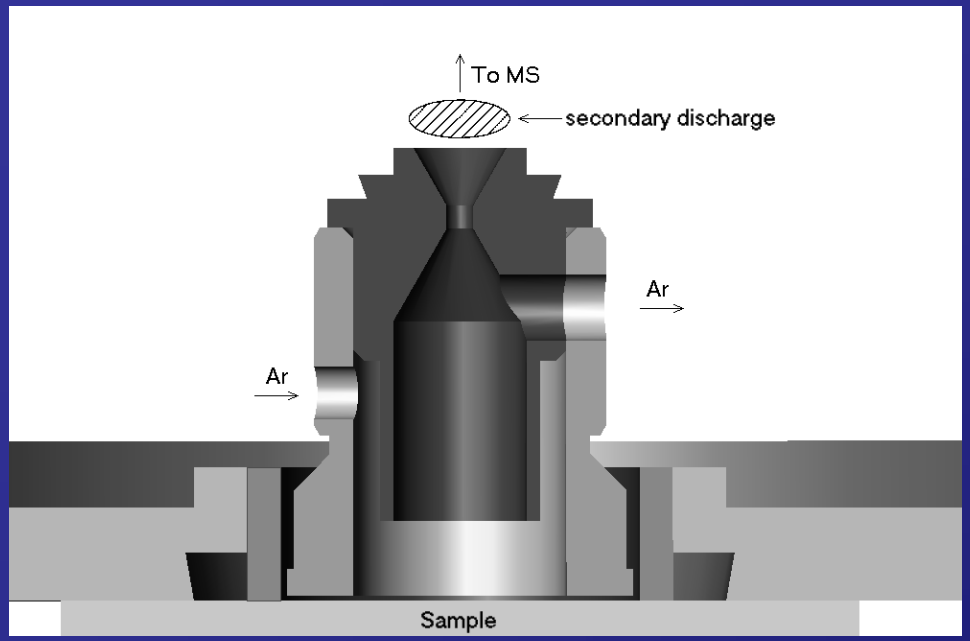
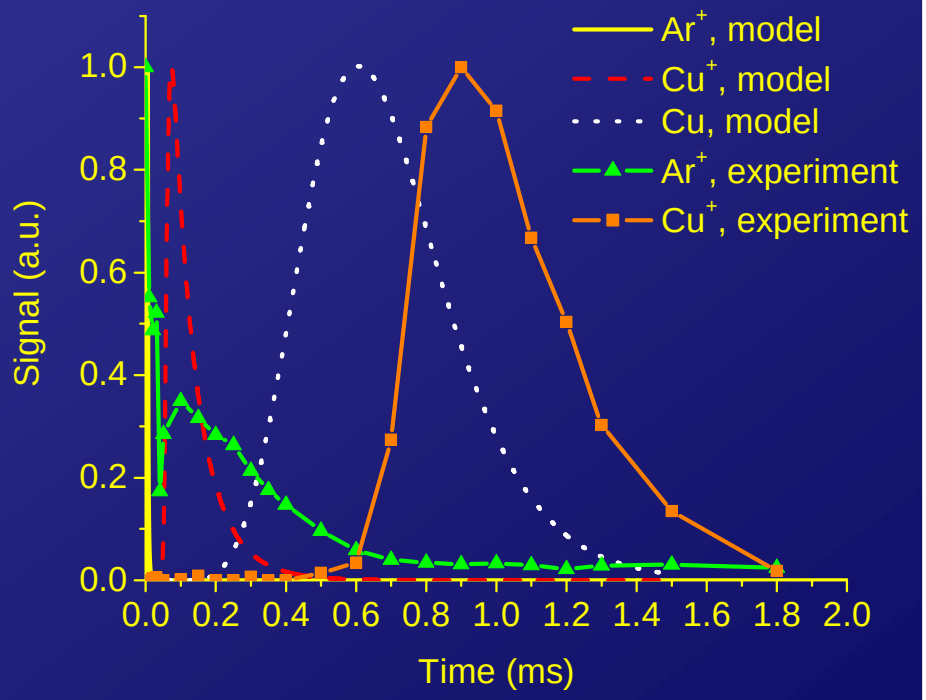
Secondary discharge in a fast flow source





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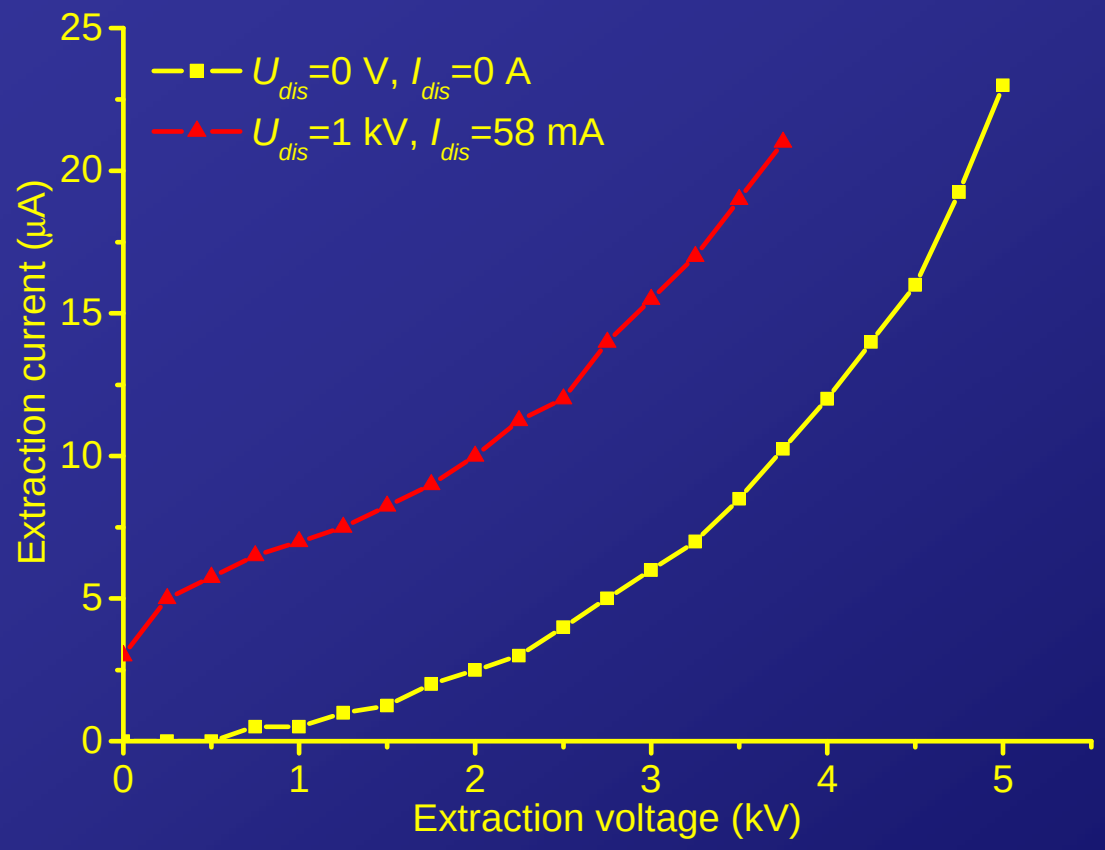

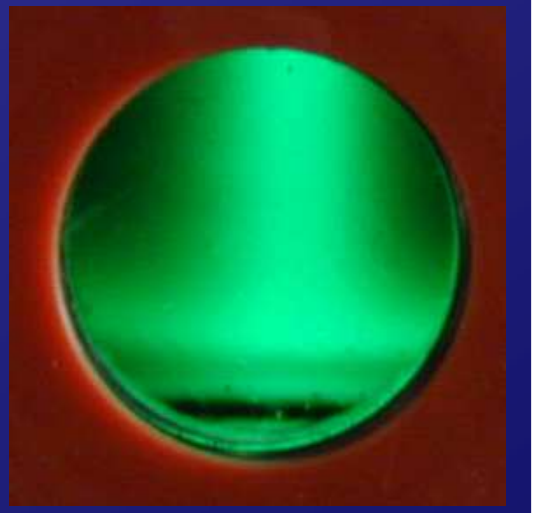

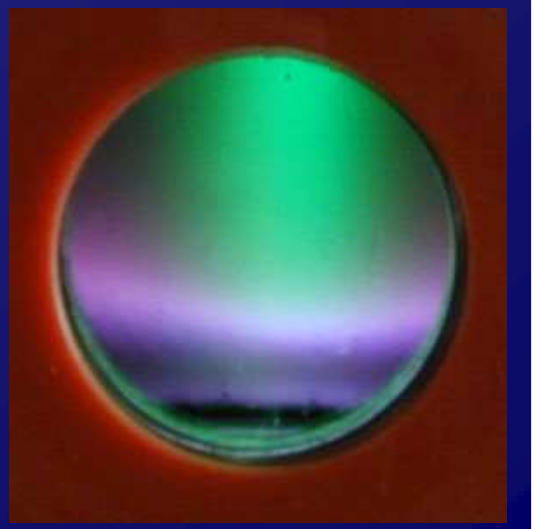

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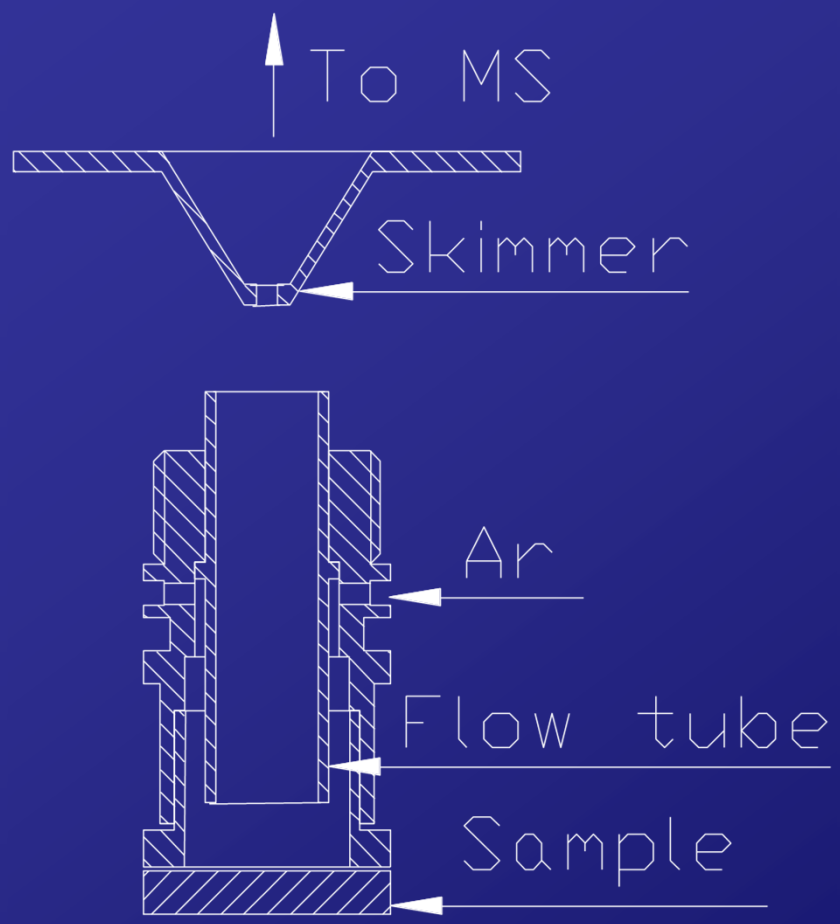
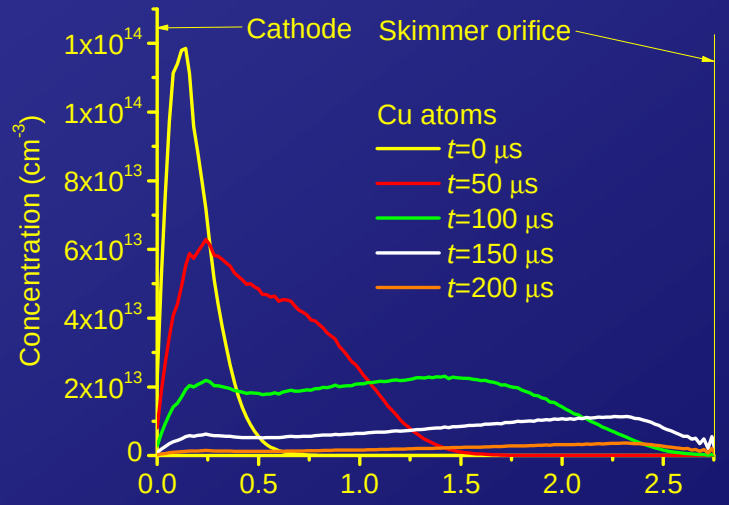
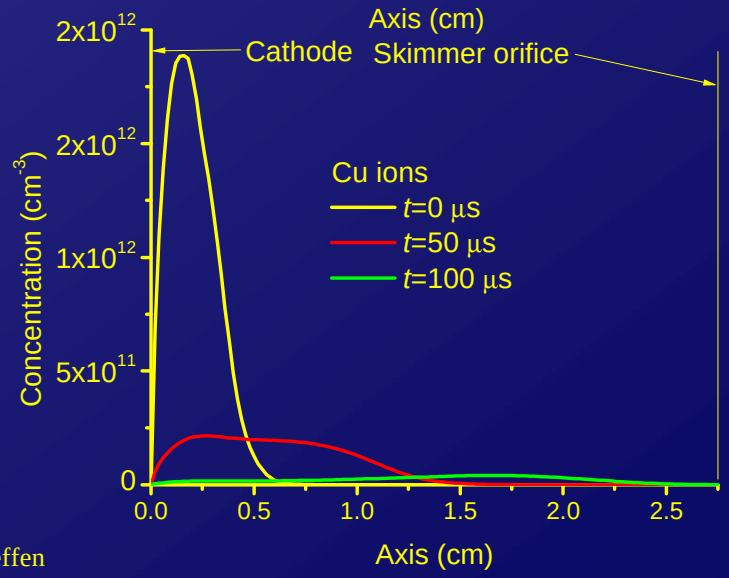
Optimization of PGD in a fast flow source







M. Voronov, P. Šmíd, V. Hoffmann, Th. Hofmann, C. Venzago,
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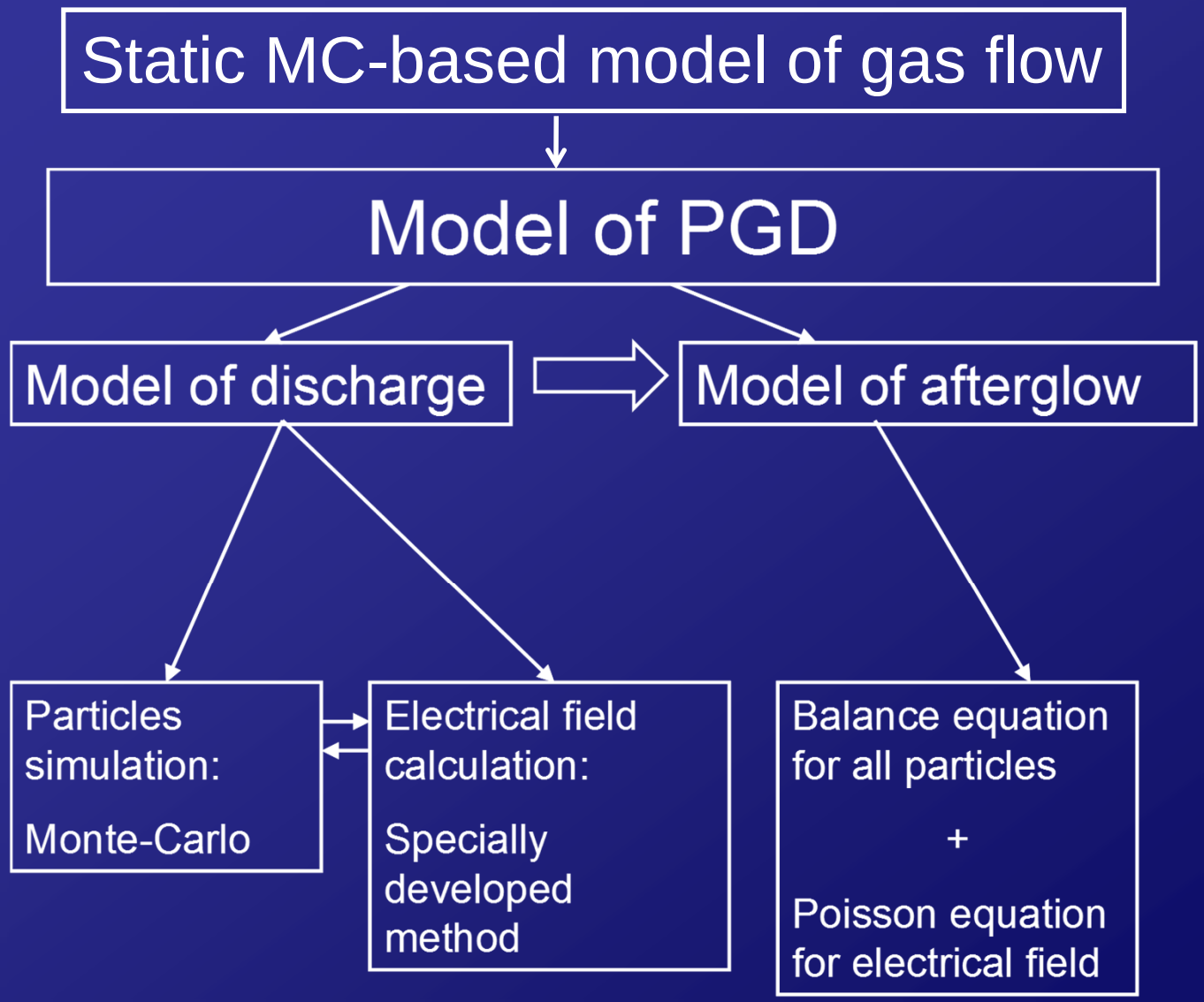
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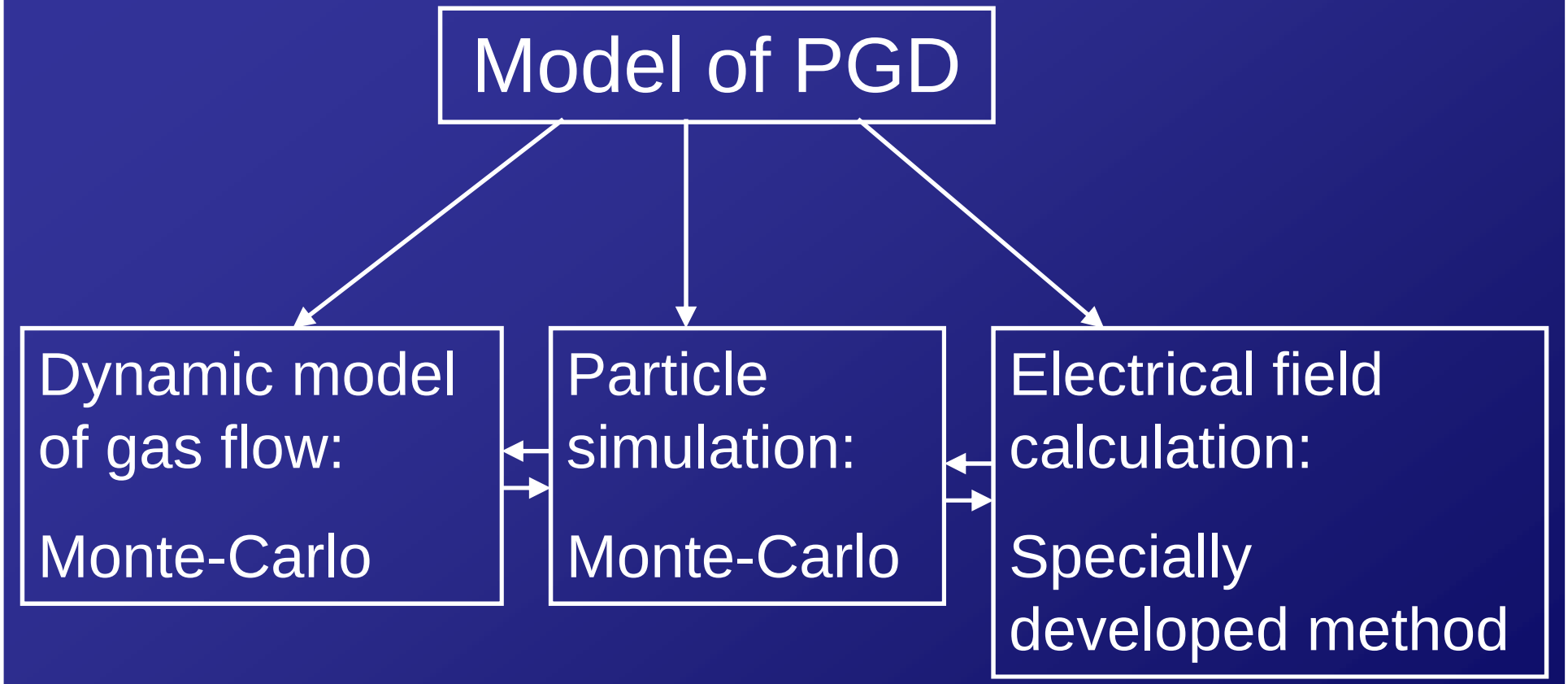
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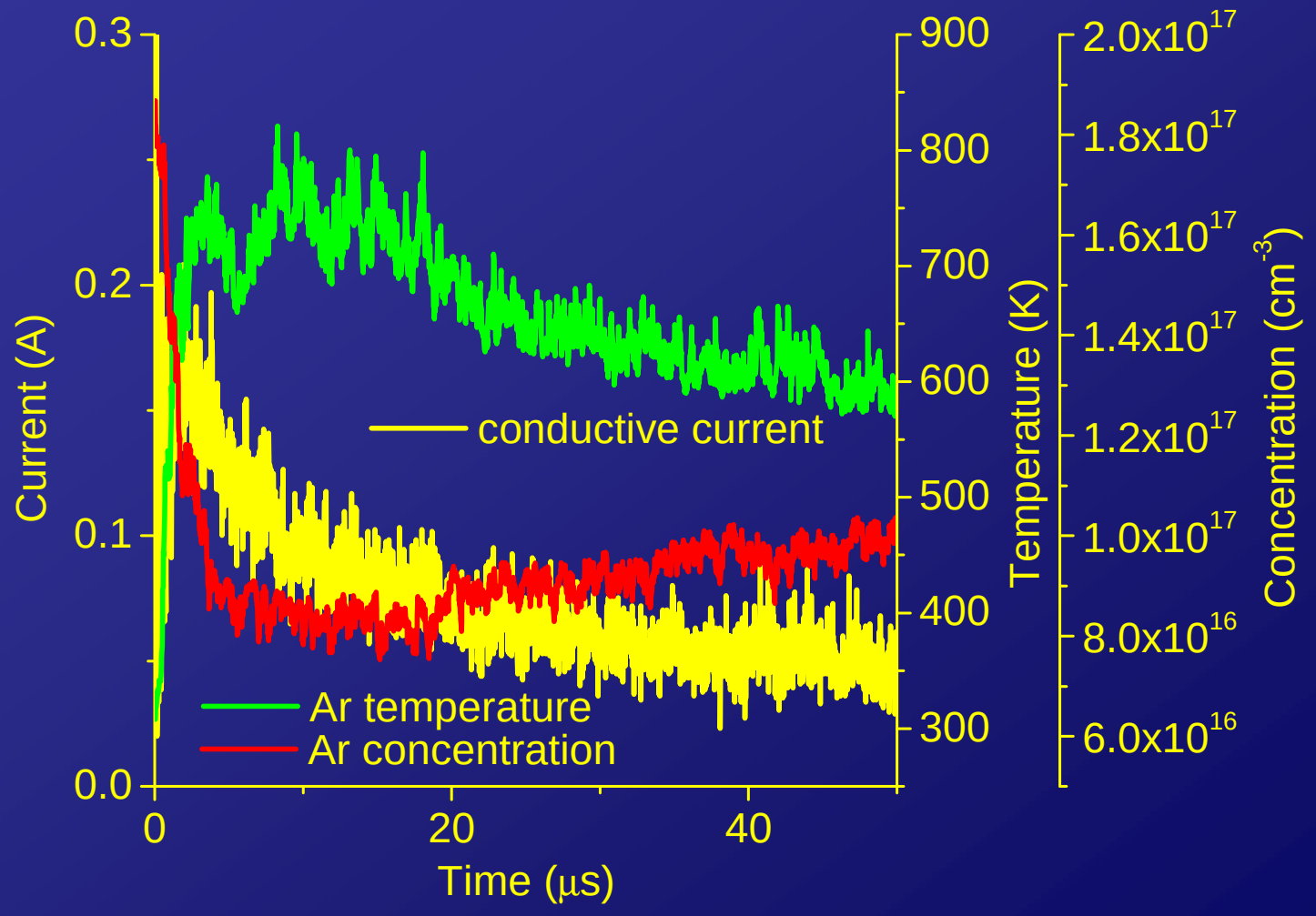
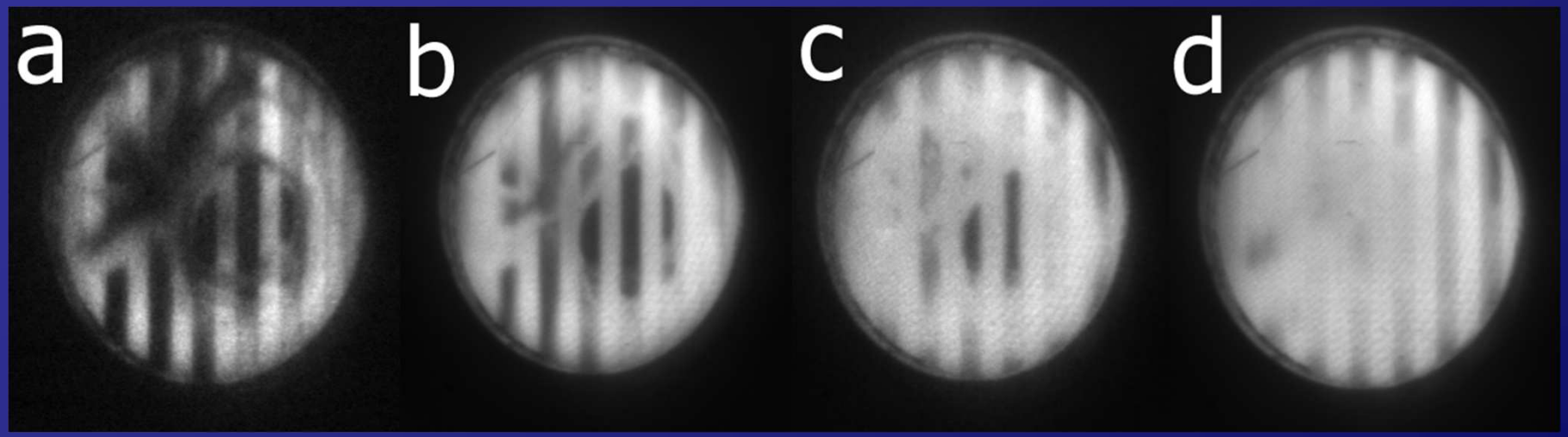
Electrical prepeak formation

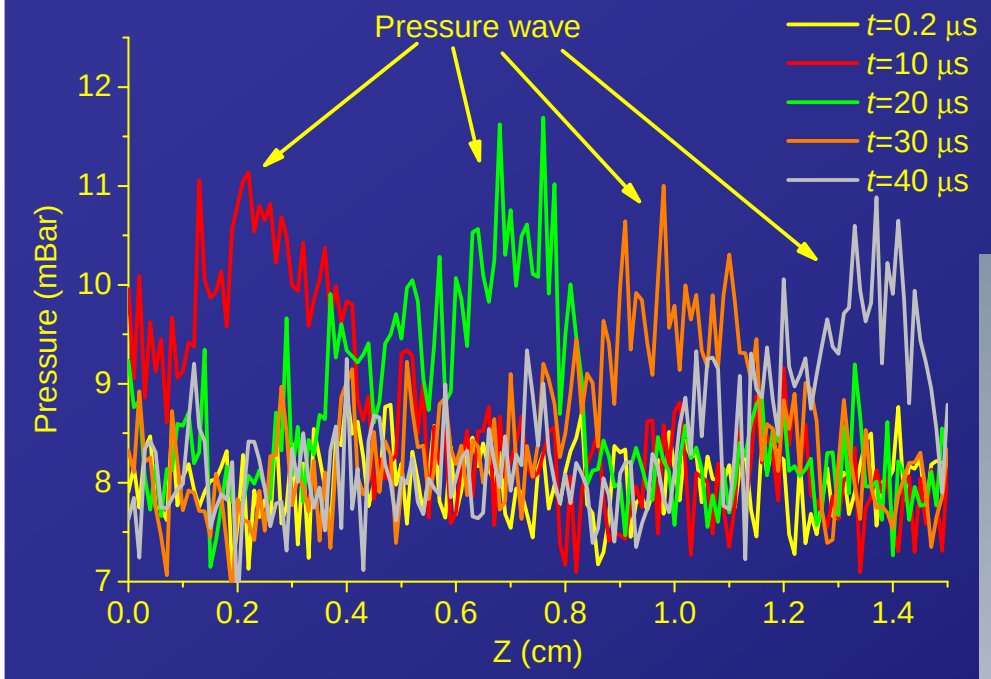


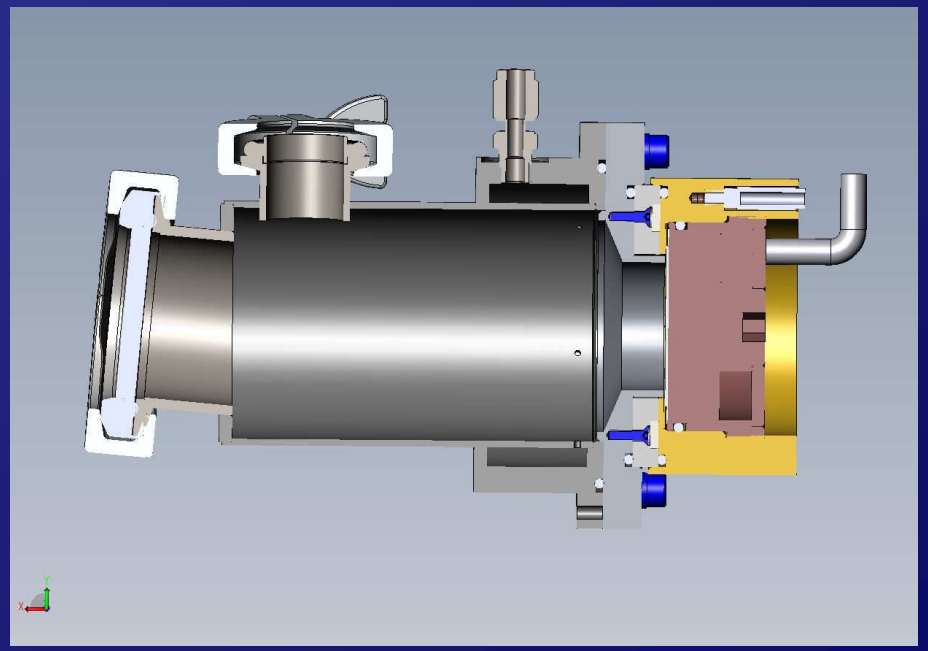
Electrical prepeak formation
PGD imaging spectroscopy



U=400 V *U*=500 V *U*=600 V *U*=800 V

Pressure waves formation





Summary

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- Model of PGD is developed and applied for practical applications
- Applications: optimization of sources, secondary discharge, simulation of prepeak and pressure waves

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Many thanks for your attention!