

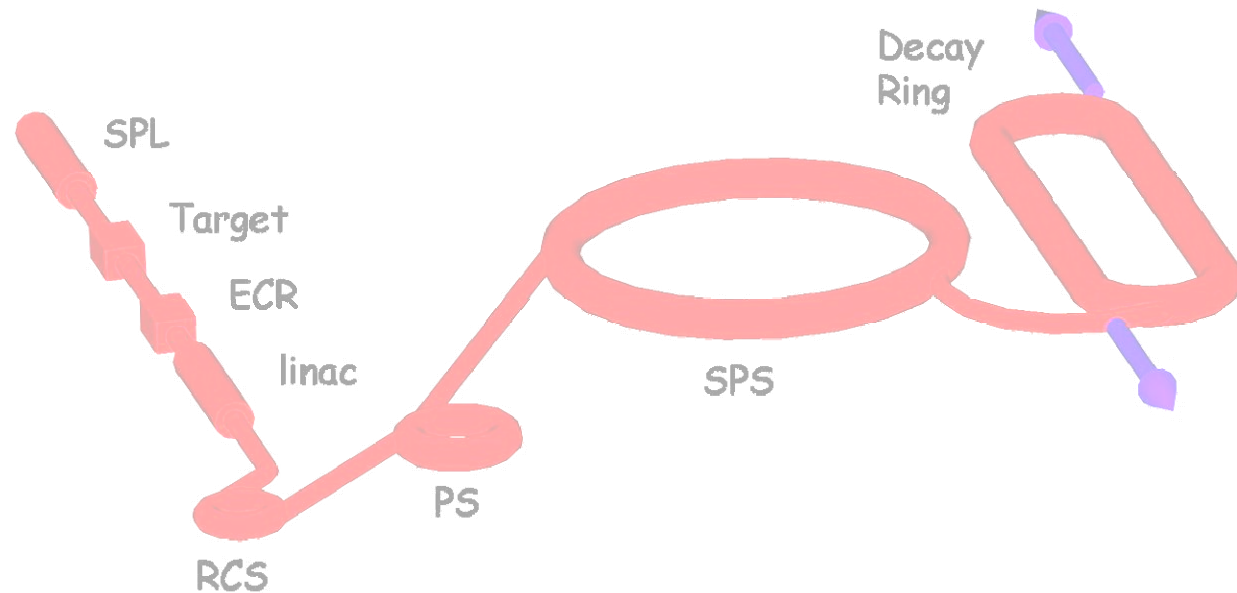
# Dynamic Vacuum in RCS and Decay Ring

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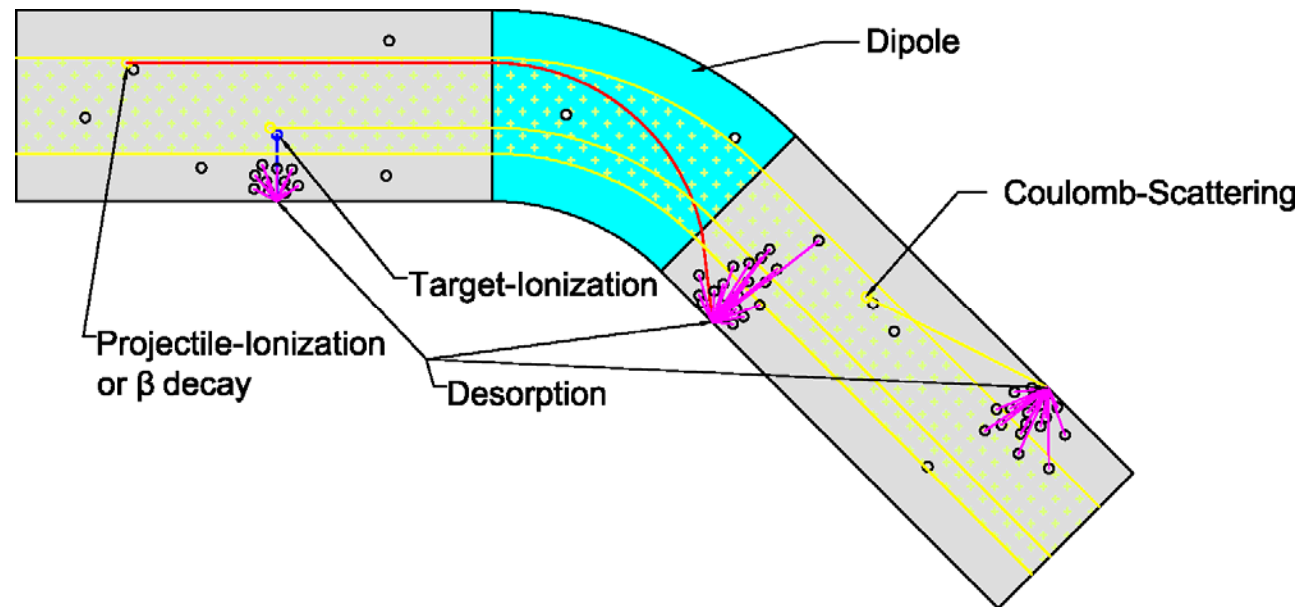
# Contents

- RCS vacuum system and dynamic evolution
- Decay ring vacuum system and dynamic evolution
- Conclusions



## STRAHLSIM:

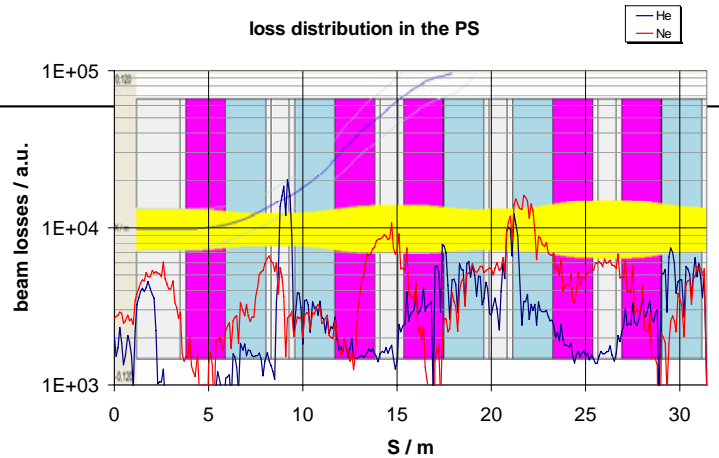
- Calculation of space charge potential and estimation of kinetic energy of „target ions“ added
- Desorption yield for low energetic ions between 1-10 not well known – scaling according  $dE/dx$



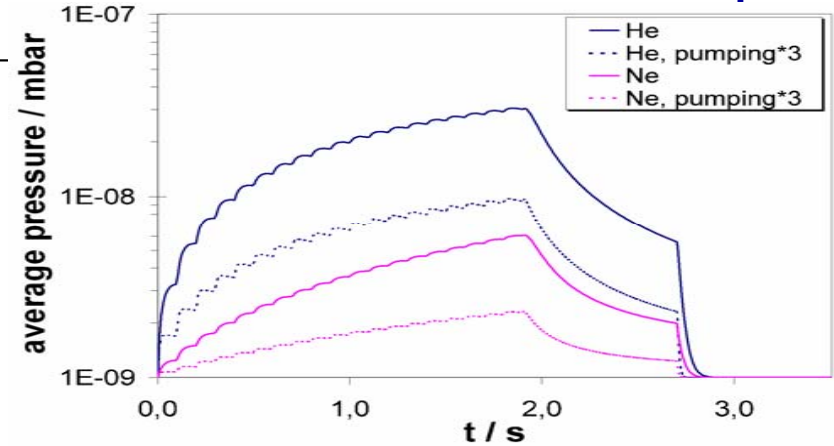
# Loss distribution and dyn. vacuum



PS

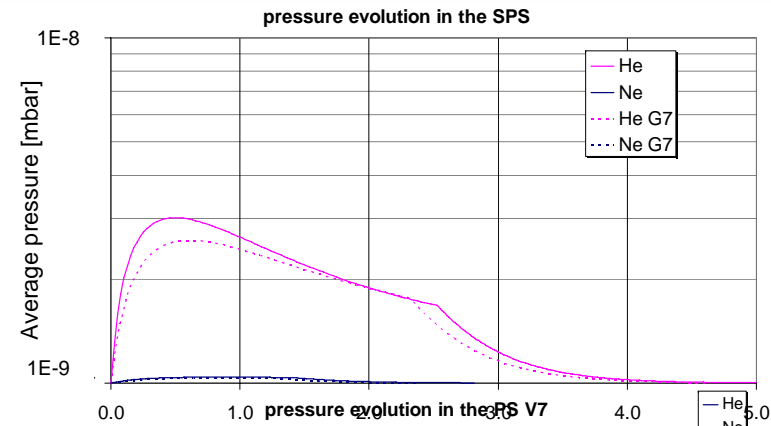
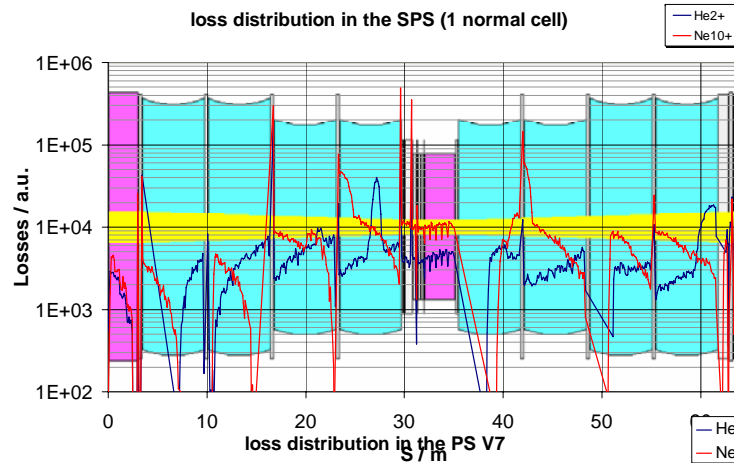


## Pressure evolution due to desorption



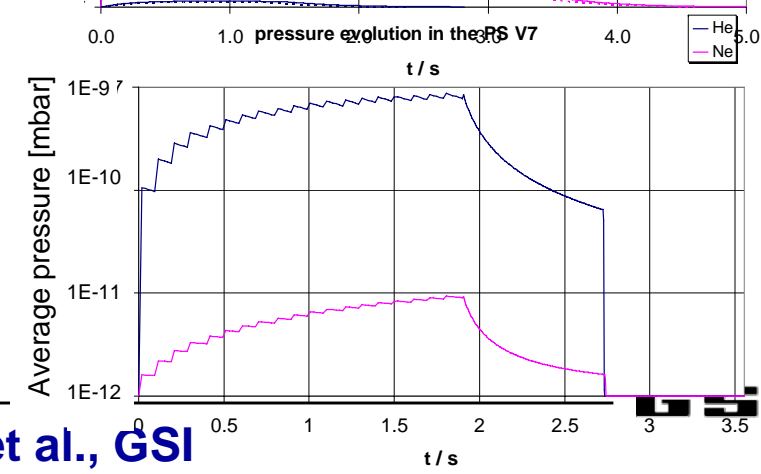
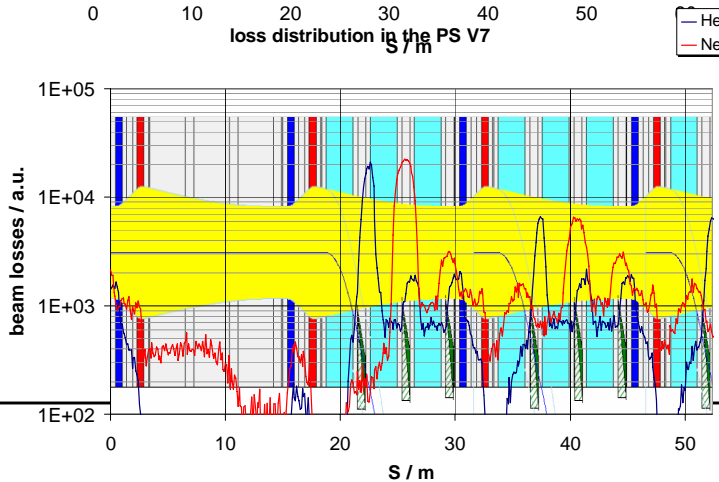
PS

SPS



SPS

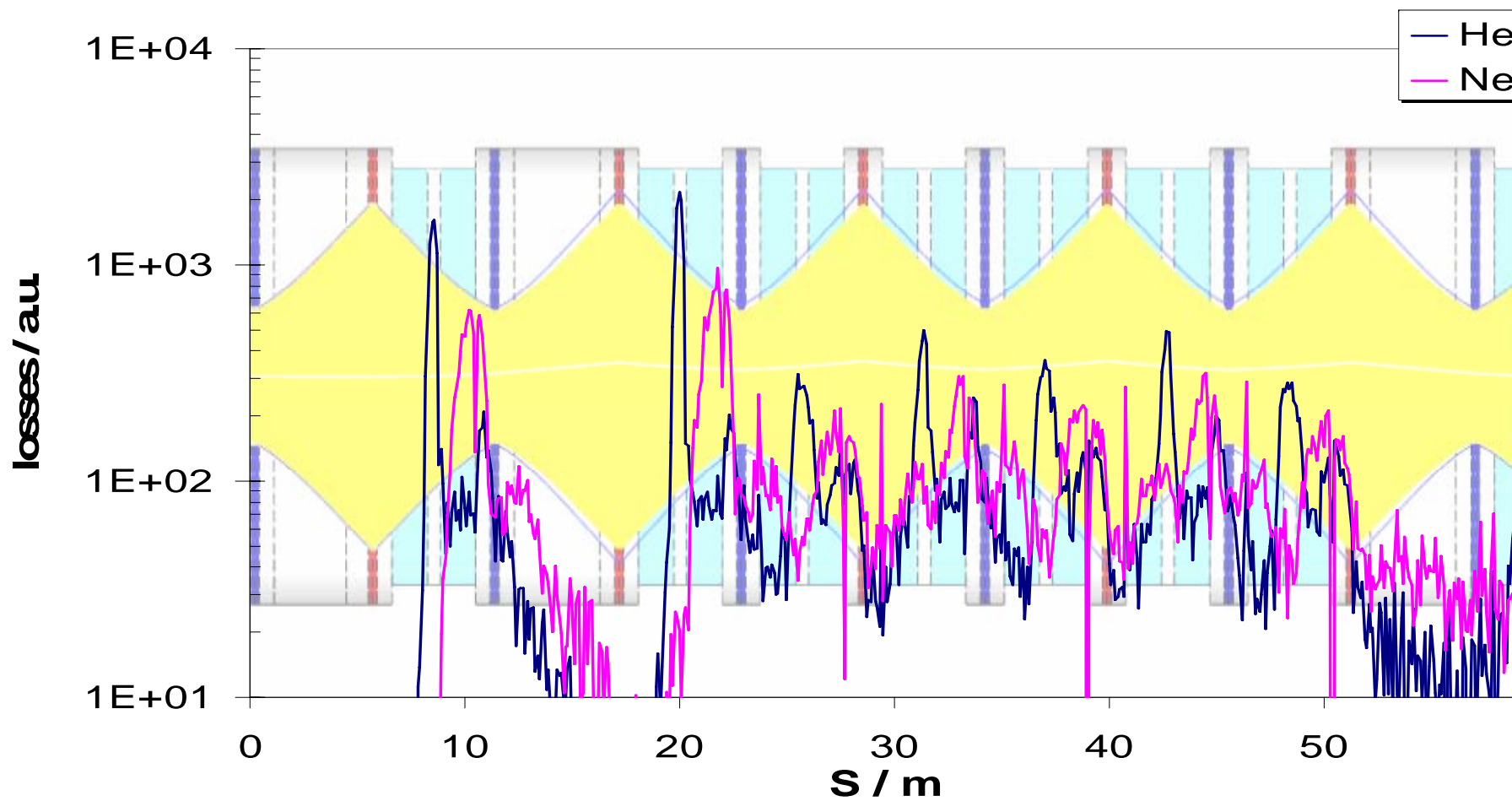
New "PS"



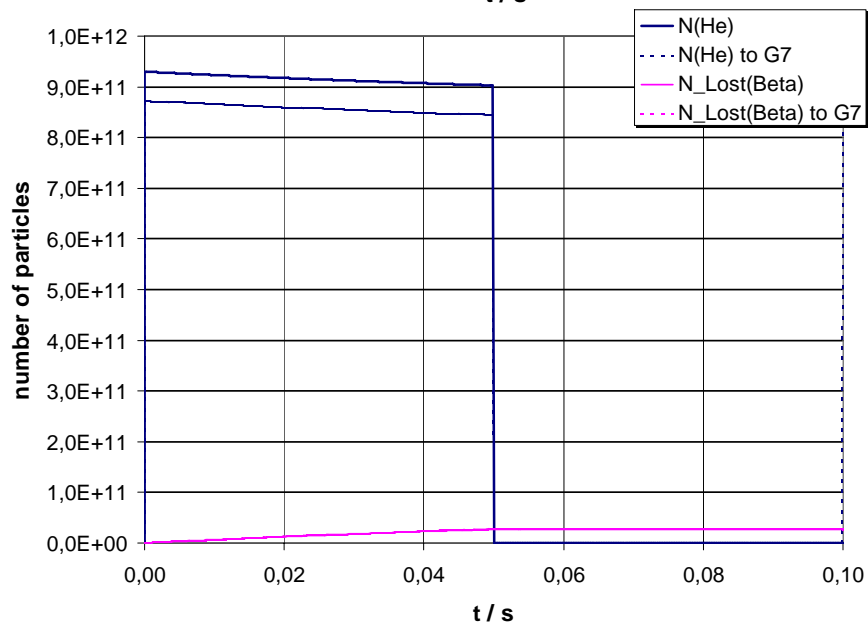
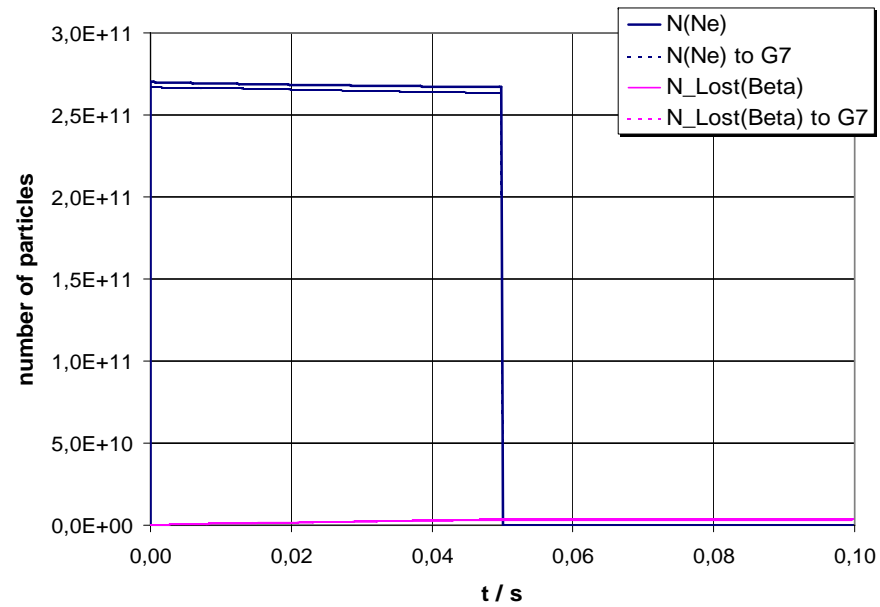
New "PS"



# Loss Distribution in RCS



# Beam Loss in RCS



# RCS UHV System and Dynamics

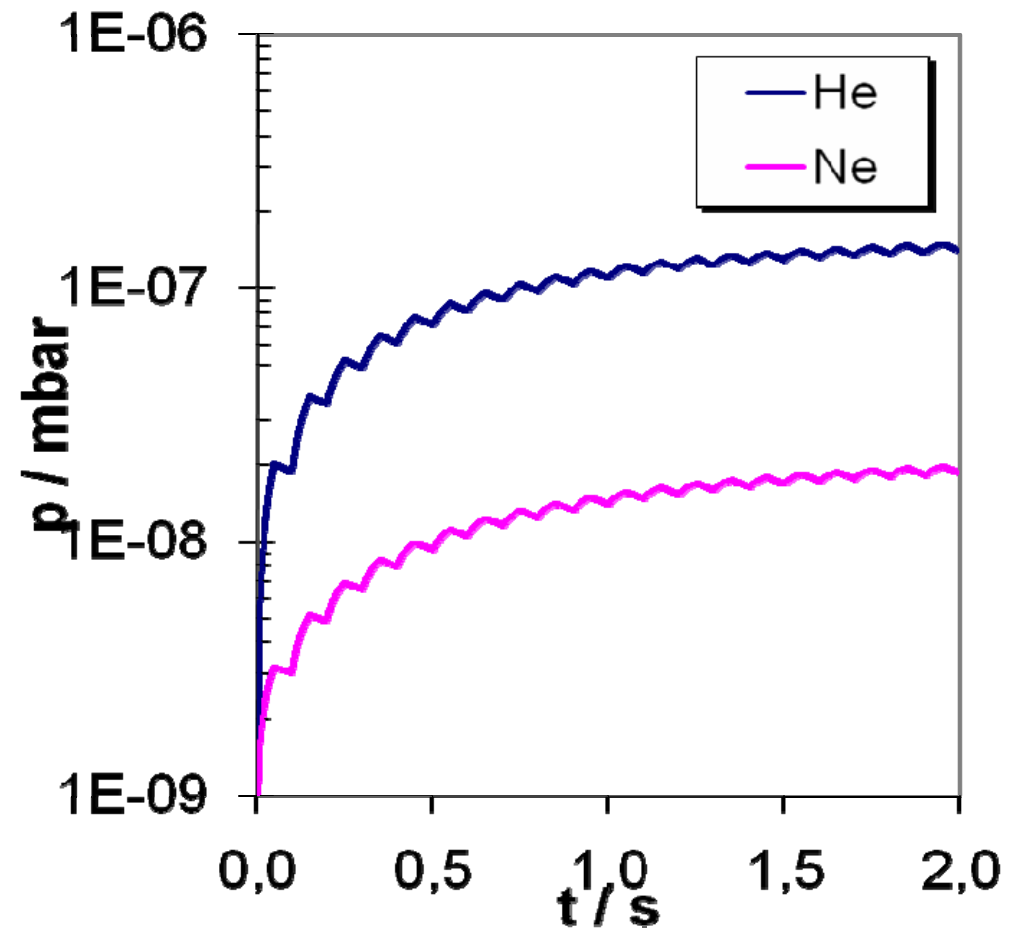


- $V = 1,5 \text{ m}^3$
- $S_{\text{eff}} = 2 \text{ m}^3/\text{s}$  for  $\text{N}_2$  ( $\tau = 0,75 \text{ s}$ )
- $p_0 = 1 \cdot 10^{-9} \text{ mbar}$

- 38 %  $\text{H}_2$
- 54,4 %  $\text{H}_2\text{O}$
- 7,6 %  $\text{N}_2$

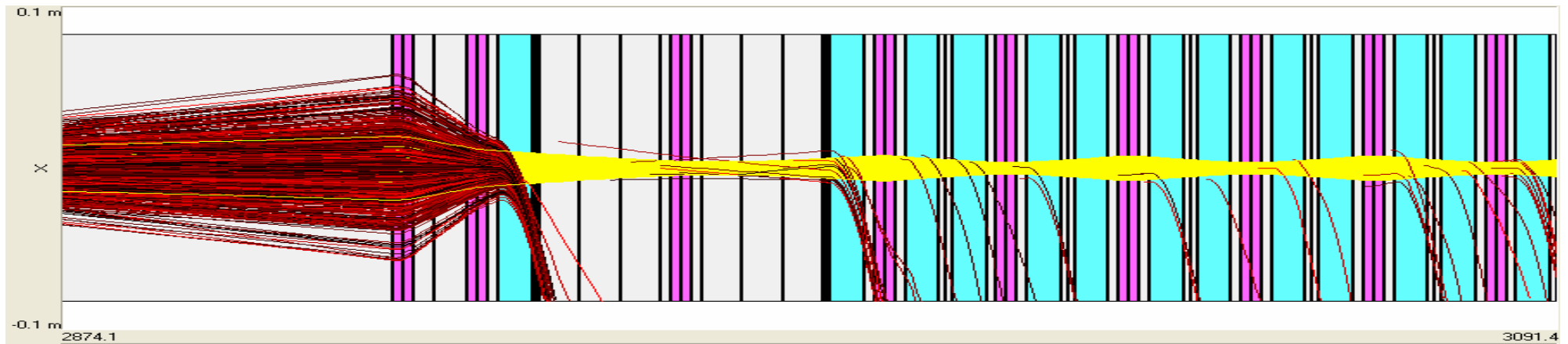
Desorption rate  $\eta_{\text{Z}} = 28.000 \text{ mol/ion}$  for beam ions,  $\eta = 1$  for ionized rest gas (acceleration by beam potential low enough)

Long term pressure evolution (calc. with StrahlSim)

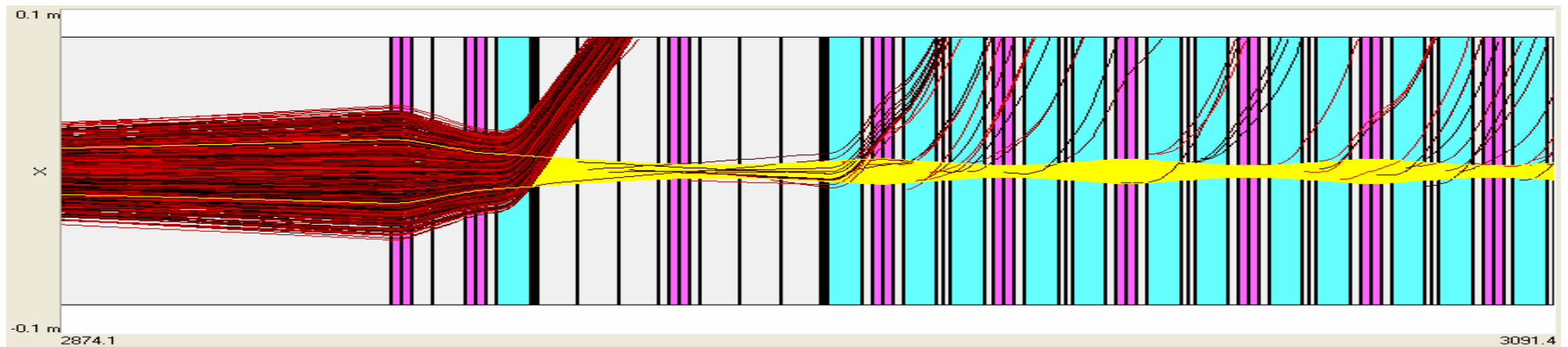


# Beam Loss in Decay Ring

He<sub>β</sub> beam



Ne<sub>β</sub> beam





# Decay Ring UHV System and Dynamics

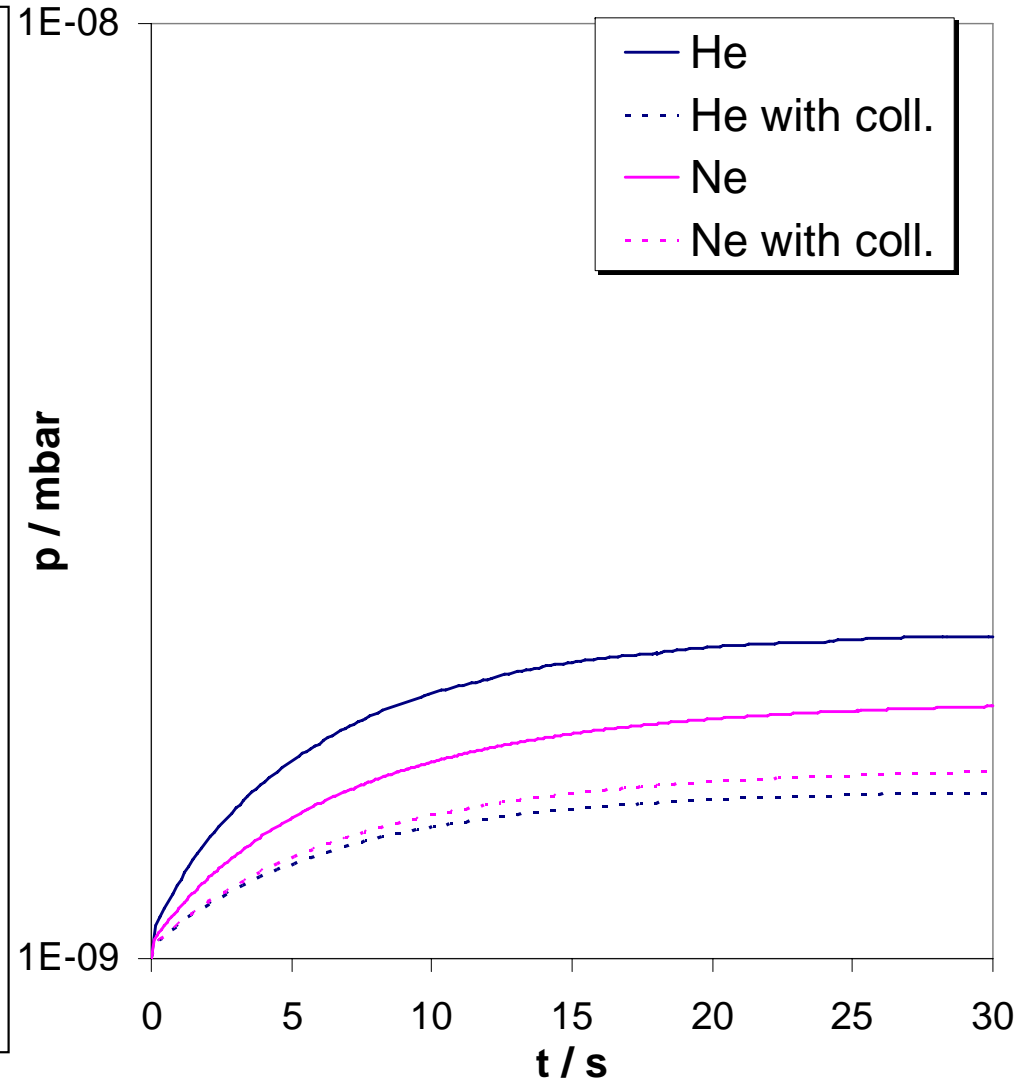


- $V = 64,67 \text{ m}^3$
- $S_{\text{eff}} = 2,28 \text{ m}^3/\text{s} + 28,94 \text{ m}^3/\text{s}$  (cold surfaces) for  $\text{N}_2$  ( $\tau = 2,07 \text{ s}$ )
- $p_0 = 1 \cdot 10^{-9} \text{ mbar}$

- 38 %  $\text{H}_2$
- 54,4 %  $\text{H}_2\text{O}$
- 7,6 %  $\text{N}_2$

Desorption rate  $\eta_{\perp} = 22.000 \text{ mol/ion}$  for beam ions,  $\eta = 1$  for ionized rest gas (acceleration by beam potential low enough)

Long term pressure evolution (calc. with StrahlSim)



Pressure increases up to an equilibrium value – no instability

- RCS  $\sim 10^{-7}$  mbar  
pumping speed sufficient for the volume
- Decay ring  $< 10^{-8}$  mbar  
pumping speed sufficient for the volume  
long straight sections  
septa before the arcs for the daughter products