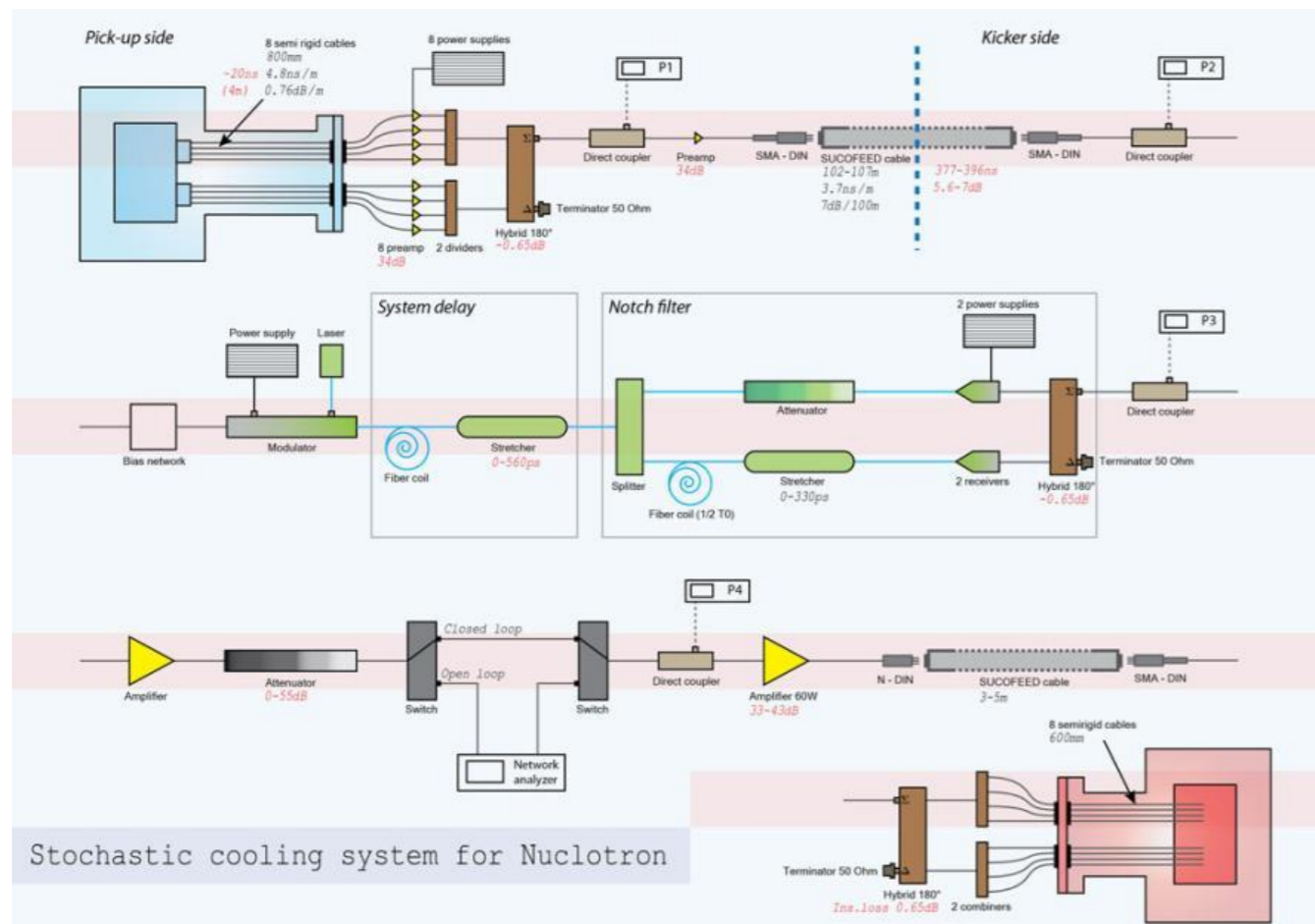


Stochastic Cooling in the 4th Commissioning Run of the NICA Complex

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Stochastic cooling system is being developed at the NICA collider to increase the beam density during accumulation and maintain luminosity during heavy ion collisions. The stochastic cooling channel at the Nuclotron is used to test the elements of the collider stochastic cooling system. Before the 4th commissioning run at the Nuclotron, the kicker of the stochastic cooling channel was replaced with a structure based on a ceramic vacuum chamber and a corrugated surrounding. In the course of the 4th NICA commissioning run, the longitudinal degree of freedom of the beam was cooled by the filter method and, for the first time in Russia, by the time-of-flight method with an additional delay of 1 revolution. The poster presents the results of processing experimental data on the stochastic cooling of $124\text{Xe}54+$ beams in the Nuclotron during the 4th commissioning run.

Nuclotron Stochastic Cooling



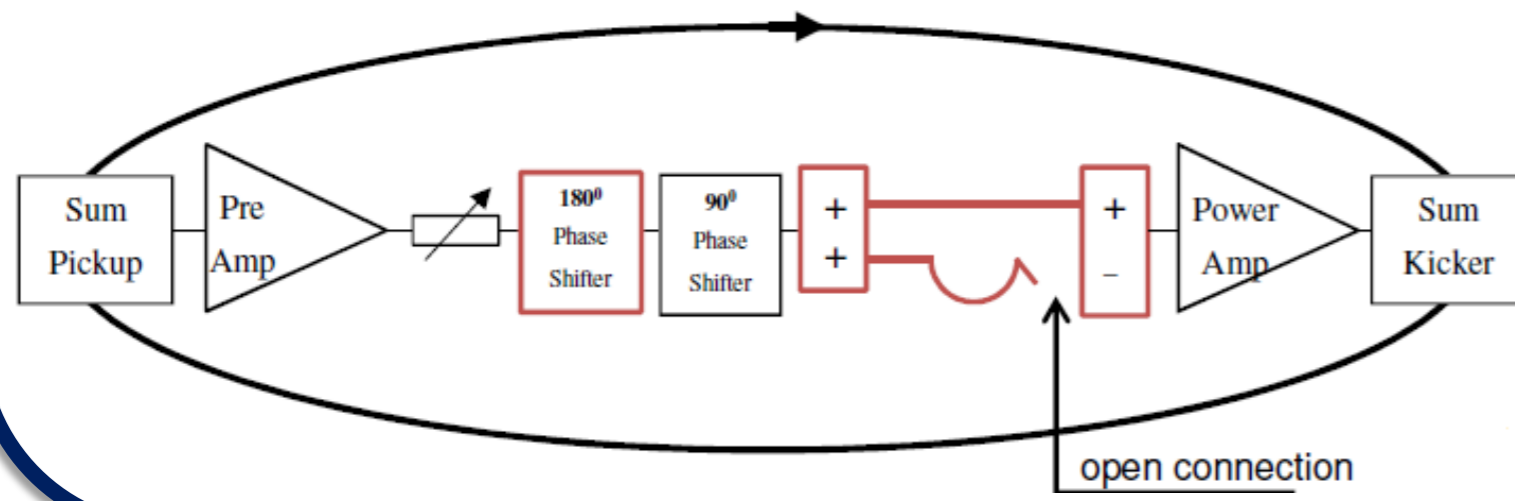
NICA 4th Commissioning Run

Parameters

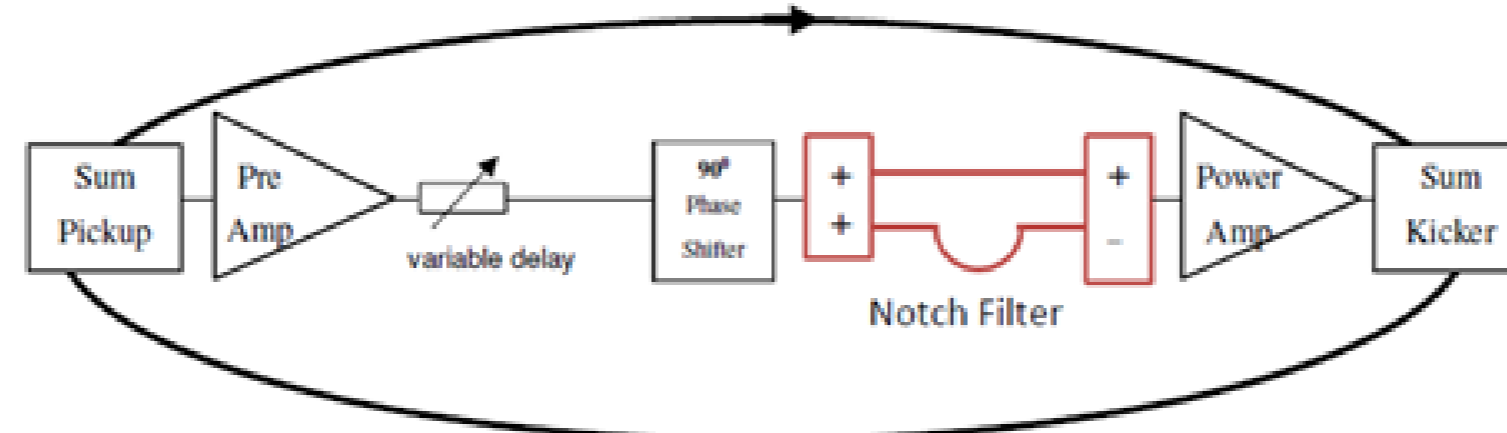
Circumference, m	251.52
Ions	$124\text{Xe}54+$
Energy, GeV/u	3.05
Momentum slip-factor, η	$5 \cdot 10^{-2}$
Number of ions	$1 \cdot 10^7$
Initial momentum spread, $\Delta p/p_0$	$2 \cdot 10^{-4}$
Bandwidth, GHz	1.7 – 2.3
Output power, W	< 20

Cooling Methods

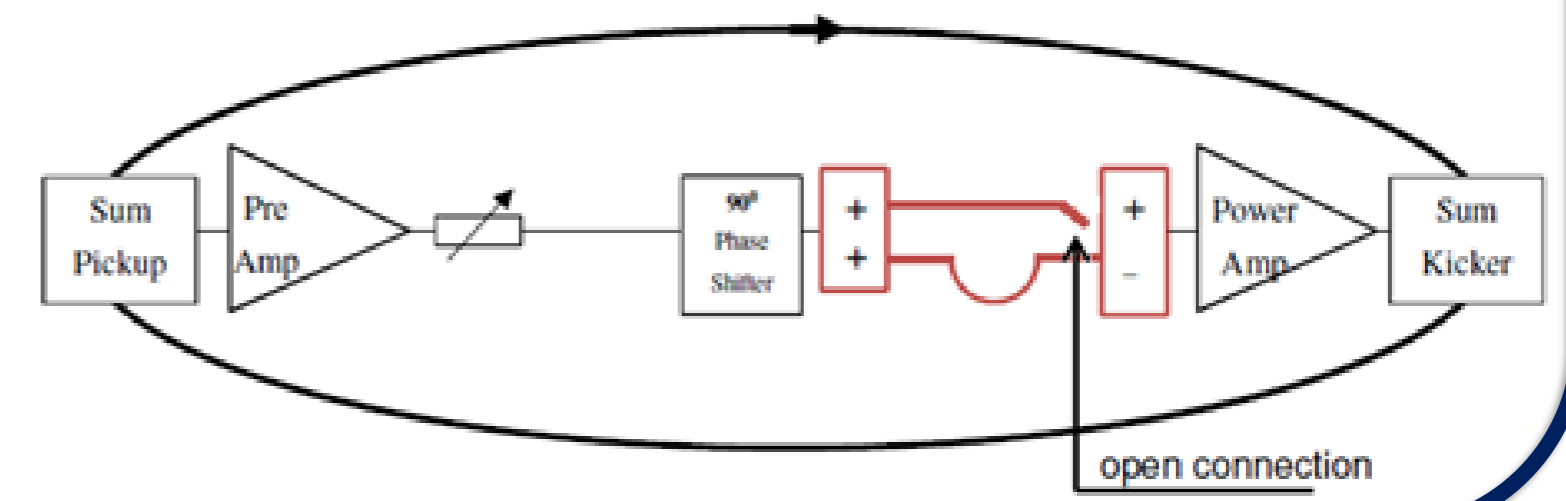
TOF cooling:



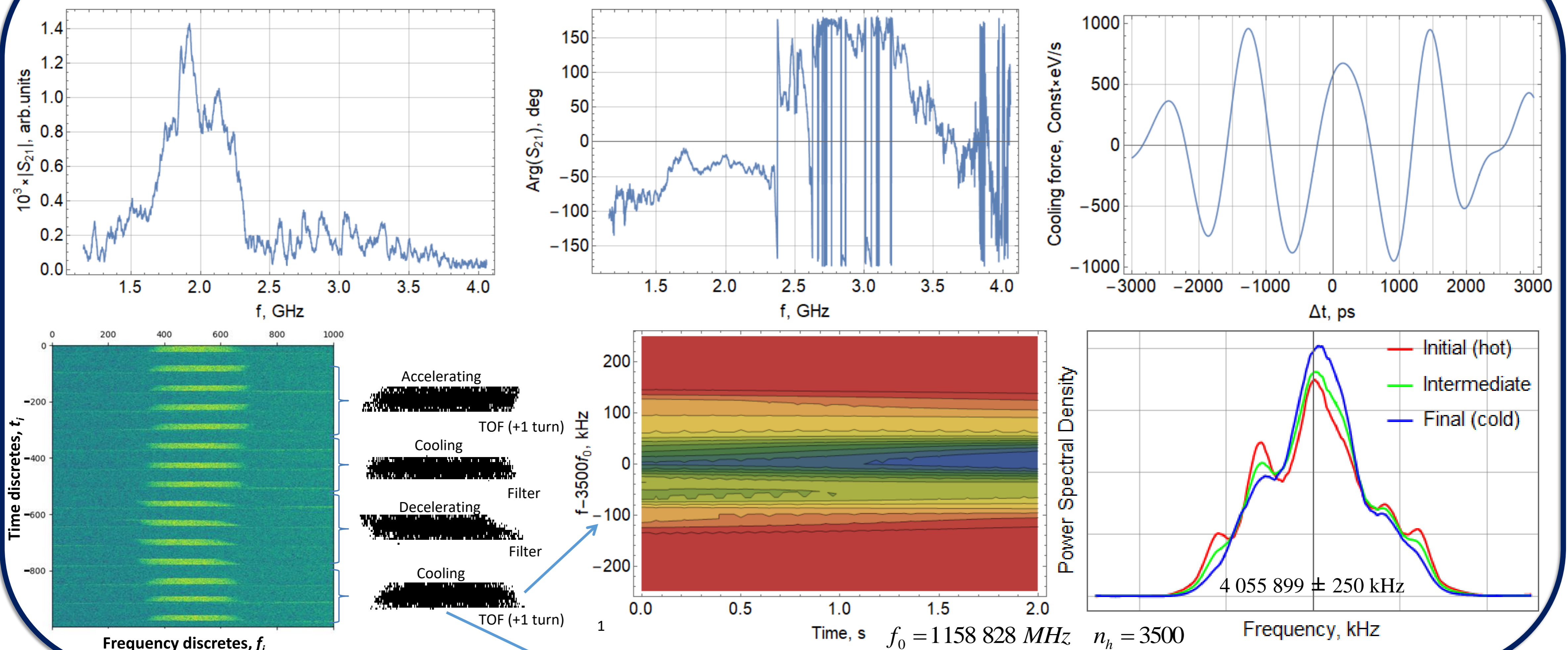
Filter cooling:



TOF cooling (+1 rev. turn)



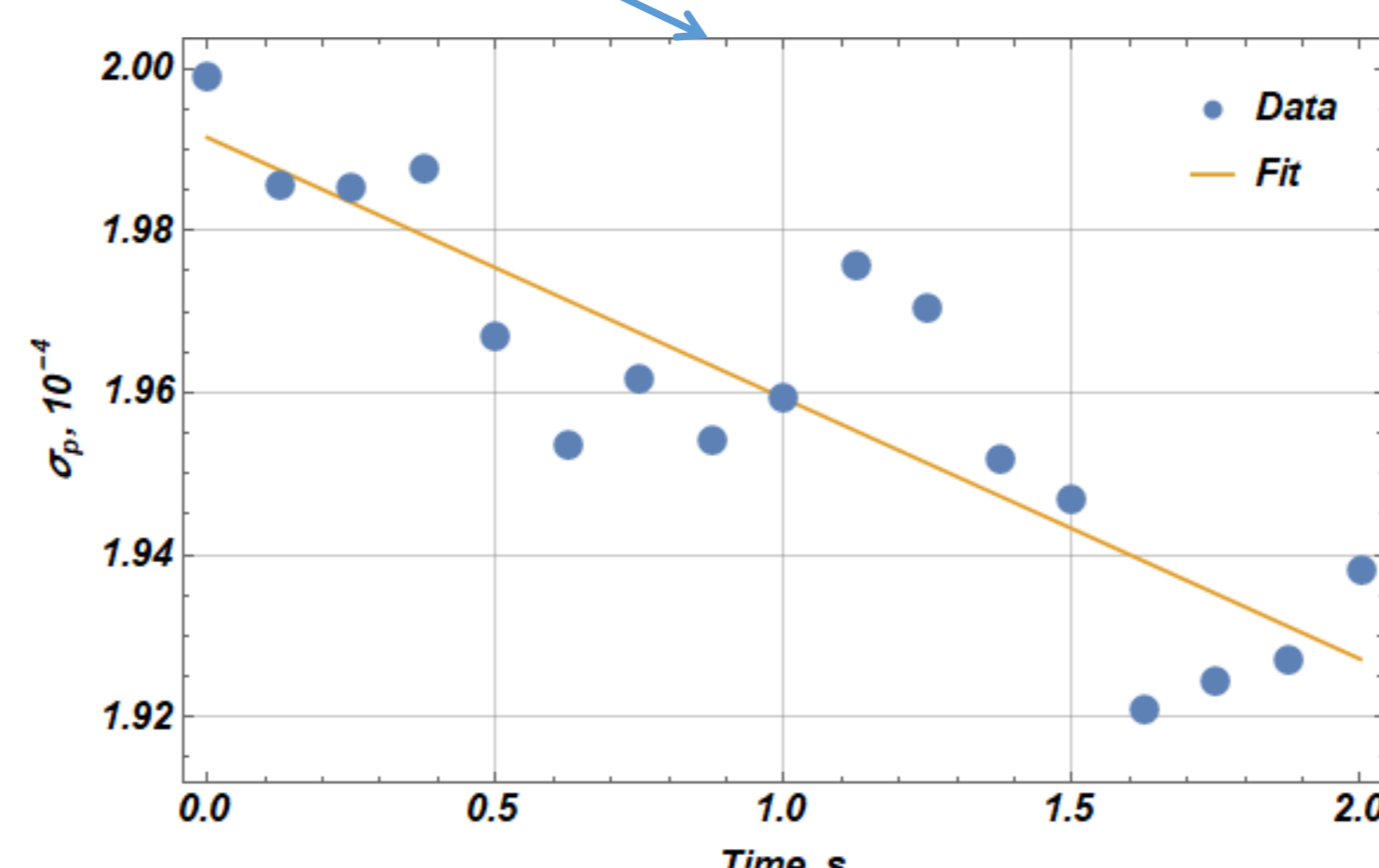
Measurements & Processing



EMI/EMC Problems

1. Mobile & Wi-Fi Interference at Kicker
2. Kicker & Pickup Coupling (3.2 GHz)
3. Line Network coupling (4.0 GHz)

Results



Ions	$124\text{Xe}54+$
Energy, GeV/u	3.05
η	$5 \cdot 10^{-2}$
Intensity	$1 \cdot 10^7$
$\Delta p/p_0$	$2 \cdot 10^{-4}$
Bandwidth, GHz	1.7 – 2.3
Output power, W	11
Cooling time theor., s	8.8
Cooling time exper., s	16