



Contribution ID: 1766 Contribution code: TUPM115

Type: **Poster Presentation**

## Phase space painting of a self-consistent Danilov distribution in the SNS ring

*Tuesday, 9 May 2023 16:30 (2 hours)*

The  $\{2, 2\}$  Danilov distribution is self-consistent —it is a Vlasov equilibrium distribution that produces linear space charge forces. Additionally, the distribution has zero (four-dimensional) transverse emittance. Thus the Danilov distribution may be of use for overcoming space charge limitations at high intensities, increasing collider luminosity, or pushing the limits of transverse bunch compression using round-to-flat transformers. When such a distribution is matched to one of the eigenmodes of a ring it is possible to use phase space painting to build the distribution over many turns, maintaining self-consistency throughout. This provides a way to create high-intensity beams with unique properties that could increase accelerator performance, with direct implication for experiments. Here we report on the results of a proof-of-principle experiment using the flexible transverse phase space painting system at the Spallation Neutron Source to demonstrate the creation of an approximate Danilov distribution, including the effect of recently installed solenoid magnets.

### Funding Agency

This work performed by UT-Battelle, LLC,  
under Contract No. DE-AC05-00OR22725 with the U.S.  
Department of Energy, and partially supported by Field Work Proposal ORNL-ERKCS41.

### Footnotes

### I have read and accept the Privacy Policy Statement

Yes

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**Session Classification:** Tuesday Poster Session

**Track Classification:** MC4: Hadron Accelerators: MC4.T12: Beam Injection/Extraction and Transport