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Type: Talk

## Observation of a strong diocotron instability in an antiproton plasma ring and “tailoring” of pure electron plasmas in the strong drive regime

*Saturday 5 September 2020 13:05 (25 minutes)*

Non-neutral plasmas –in the zero temperature limit - can be described in analogy to a 2-dimensional fluid [1]. We observe the temporal stages of a Kelvin-Helmholtz-like diocotron instability of an antiproton ring. The evolutionary stages are comprised of a linear part during which the instability grows, followed by a collapse of the ring into vortices, and a nonlinear part consisting of vortex interactions. Some characteristics of the evolutionary stages can be related to the initial ring dimensions.

A second part of the talk addresses the so-called SDREVC (strong drive evaporative cooling) technique, which was pioneered by [2], and which we have successfully implemented in the AEGIS experiment. The technique “tailors” pure electron plasmas in terms of their radii, densities and thus particle number to an accuracy of 1-2 %. This is an improvement of a factor of 10 with respect to what was reported by experiments from the low-energy antimatter community prior to SDREVC.

[1] R. H. Levy, “Diocotron instability in a cylindrical geometry”, *The Physics of Fluids* 8, 1288–1295 (1965).

[2] ALPHA collaboration “Enhanced control and reproducibility of non-neutral plasmas”, *Phys. Rev. Lett.* 120, 025001 (2018).

### Is this abstract from experiment?

Yes

### Internet talk

Yes

### Name of experiment and experimental site

AEGIS, Antiproton Decelerator @ CERN

### Is the speaker for that presentation defined?

Yes

### Details

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