



## **Breaking the Hexagonal Lattice Barrier: Experimental Achievement of Square Lattice Formation in 2D Dusty Plasma Crystal**

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The structural phase transition in the 2D system has garnered substantial interest in the context of fundamental studies as well as material sciences. The complex plasma crystals have been used extensively to investigate the geometrical nature of crystalline lattices in a 2D system. To date, no experimental evidence of the structural phase transition in 2D complex plasma has been reported. The inherent non-reciprocal interaction of wake-particles hinders the formation of lattice configuration other than the hexagonal structure <sup>[1]</sup>. Limiting this non-reciprocal wake-particles interaction has proven to be quite an experimental challenge in the complex plasma field. This work illustrates the first experimental observation of a square lattice in a 2-Dimensional mono-disperse complex plasma crystal which transpires in our system due to a structural phase transition <sup>[2]</sup>. The unique electrode configuration of our experimental device and the specific discharge

conditions inhibits the prevailing strong non-reciprocal wake-particles interaction hence expediting the formation of square lattice in our experiments. Details of our experimental findings and simulation in support of them will be presented.

### References

- [1] A. V. Zampetaki, H. Huang, C.-R. Du, H. Löwen, A. V. Ivlev, Phys. Rev. E **102**, 043204 (2020).
- [2] Swarnima Singh, P. Bandyopadhyay, Krishan Kumar, and A. Sen. Phys. Rev. Lett.,129:115003, (2022).