

## Enhanced fractional matching fields in superconducting NbN film with periodic array of antidots

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Type-II superconducting thin films having a periodic array of artificial pinning centers have been of great interest due to their excellence for the studies of the vortex pinning mechanisms. Square antidot lattice has been fabricated on NbN thin film by electron beam lithography. We study the temperature and current dependent matching effect by the artificial hole array in superconducting NbN thin films. We observed the interplay between the vortex quantization and the artificial antidot lattice. Magneto-resistance minima at integer matching fields up to five times of  $H_1$  (the first matching field corresponding to one vortex inside each hole) and enhanced fractional matching fields at  $1/3, 1/2, 3/2$  have been observed. These fractional matching fields are observed till  $H_6$ . Also the enhanced fractional matching fields are current and temperature dependent. In the previous work the fractional matching fields are not very sharp and repeated after first matching fields.