

# B (414)

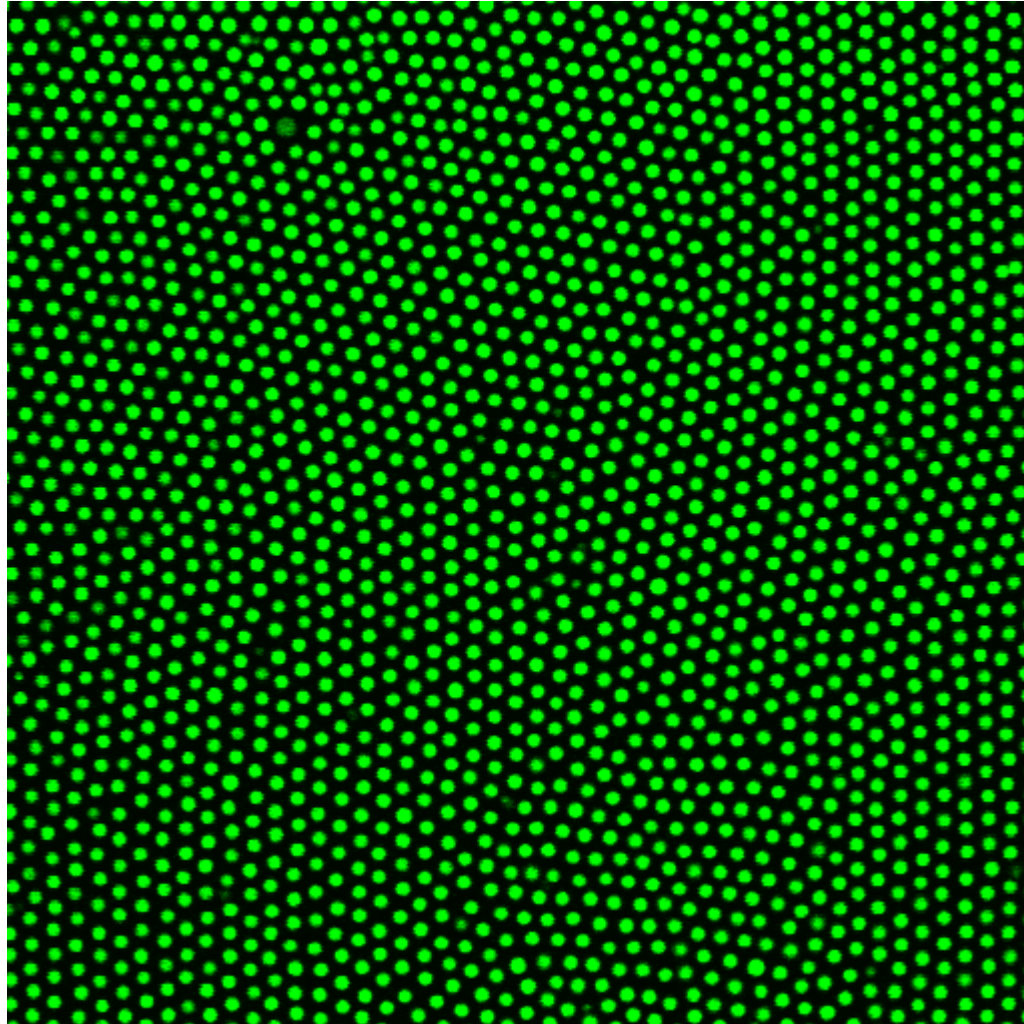
## Measuring normal modes in 2D colloidal systems

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# Motion of the colloids



# Computing normal modes with covariance matrix method

- Constructing covariance matrix from particle tracking:  $C_{i,j} = \langle [r_i(t) - \langle r_i(t) \rangle][r_j(t) - \langle r_j(t) \rangle] \rangle$   
 $\langle \rangle$ : time average,  $i, j$  : particle index
- Eigenvectors give normal modes, eigenvalues yield frequencies  $\omega$  [1]:  $\lambda = kT / m\omega^2$
- Reveals normal modes at single-particle level.