

ICAP2022

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Type: **Poster presentation**

Nonequilibrium dynamics in a quenched ferromagnetic spinor Bose-Einstein condensate

Thursday, 21 July 2022 17:00 (1h 30m)

In this poster, we will present recent experiments on a quenched ferromagnetic spinor BECs. In the first part, we present the observation of spin-momentum correlated matter-wave jets from spinor BECs [1]. Preparing a quasi-two-dimensional condensate in the $m_F = 0$ state, we quench the quadratic Zeeman energy to -2 kHz. Transversely propagating atomic beams in the $m_F = 1$ and $m_F = -1$ state ($m_F = 0$ state) are generated due to the superradiant collision process. Investigating angular correlation for each spin state, we reveal the strong correlation between spin and momentum, which suggests the possibility of being Einstein-Podolsky-Rosen (EPR) state. In the second part, we investigate the long-time relaxation dynamics after the quench [2,3]. Generated spin pairs form magnetic domains and are merged to display coarsening dynamics. We investigate correlation functions of the magnetization and observe the functions at different time collapse to a single function. Our result shows a good agreement with numerical simulation.

[1] K. Kim, J. Hur, S. Huh, S. Choi, and J.-Y. Choi, Phys. Rev. Lett. **127**, 043401 (2021)

[2] L. A. Williamson and P. B. Blakie., Phys. Rev. Lett. **116**, 025301 (2016)

[3] J. Hofmann, S. S. Natu, and S. Das Sarma, Phys. Rev. Lett. **113**, 095702 (2014).

Presenter name

SeungJung Huh

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Primary authors: HUH, SeungJung (KAIST); Mr KIM, Kyungtae (JILA); Mr HUR, Junhyeok (KAIST); Mr SEO, Jihoon (KAIST); Mr KWON, Kiryang (KAIST); Mr CHOI, Jae-yoon (KAIST)

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