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## Dynamic control of magnon–photon coupling in magnetic sphere–cavity system

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### Abstract

The dynamics of a hybrid system consisting of three magnetic spheres embedded in a microwave cavity are investigated, where each sphere is subjected to static and time-varying magnetic fields. The results show that, in a symmetric configuration with identical spheres, the cavity-mediated coupling leads to the formation of bright and dark modes. Applying periodic drives enables coherent and dynamic control over the hybrid magnon–photon states. Through Floquet engineering, the coupling between the main and drive-induced sideband modes can be precisely and reversibly tuned by adjusting the drive frequency and amplitude, providing a framework for dynamic control of hybrid states in quantum systems.

**Keywords:** Magnon, Microwave Cavity, Magnon-photon coupling, Floquet theory

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