

13<sup>th</sup>



Joint  
European  
Magnetic  
Symposia

27<sup>th</sup> August to 1<sup>st</sup> September 2023

Faculty of Medicine, UCM

M A D R I D

BOOK OF ABSTRACTS

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## Compact Localised States in Magnonics

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In bipartite lattices, the sites from sublattice A have the nearest neighbours (NN) in sublattice B only. Therefore, the mods occupying one sublattice are not able to propagate (in tight-binding models with NN hopping) and the dispersion relation can be described as flat bands with zero group velocity. Such modes, localized without defects in a perfectly periodic and infinitely extended system, are called compact localized states (CLS) [1]. The well-known type of bipartite lattice is a Lieb lattice [2]. The CLS were already observed in photonic crystals based on Lieb lattices [3] but the studies on CLS in the magnonic system still need to be performed. We proposed a perpendicularly magnetized Ga-doped YIG layer as a base for a magnonic Lieb lattice where the lattice sites are mimicked by cylindrical inclusion made of YIG (without Ga-doping). We tailored the structure to observe the oscillatory and evanescent spin waves in inclusions and matrix, respectively. We calculated the dispersion relations exhibiting Dirac cones, almost touching each other at the M-point (with a very narrow gap  $\sim 15$  MHz), intersected by a relatively flat band of magnonic CLS. Then, we supplemented our studies by considering the extended magnonic Lieb lattices, characterized by a larger number of weakly dispersive bands specific for CLS. The computations were performed by finite element method, using COMSOL Multiphysics.

### Acknowledgements

The authors would like to acknowledge the support from the National Science Center – Poland grants No. 2020/39/O/ST5/02110 and 2021/43/I/ST3/00550. GC acknowledges Polish National Agency for Academic Exchange grant BPN/PRE/2022/1/00014/U/00001.

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