Topologically nontrivial electronic bands and tunable Dirac cones in graphynes with spin-orbit coupling[1] VLADIMIR JURICIC, GUIDO VAN MIERT, CRISTIANE MORAIS SMITH, Univ of Utrecht — Graphynes represent an emerging family of carbon allotropes that differ from graphene by the presence of the triple bonds (-C≡C-) in their band structure. They have recently attracted much interest due to the tunability of the Dirac cones in the band structure. I will show that the spin-orbit coupling in β-graphyne could produce various effects related to the topological properties of its electronic bands. Intrinsic spin-orbit coupling yields high- and tunable Chern-number bands, which may host both topological and Chern insulators, in the presence and absence of time-reversal symmetry, respectively. Furthermore, Rashba spin-orbit coupling can be used to control the position and the number of Dirac cones in the Brillouin zone [1]. Finally, I will also discuss the electronic properties of $\alpha-$ and $\gamma-$graphyne in the presence of the spin-orbit coupling within recently developed general theory of spin-orbit couplings in graphynes [2].

[1] G. van Miert, C. Morais Smith, and V. Juricic, Phys. Rev. B **90**, 081406(R) (2014).
[2] G. van Miert, V. Juricic, and C. Morais Smith, Phys. Rev. B **90**, 195414 (2014).

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