

Fizički odsjek Prirodoslovno matematičkog fakulteta Sveučilišta u Zagrebu  
Bijenička c. 32, HR-10000 Zagreb

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## Seminar Fizičkog odsjeka

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Vrijeme (s.t.)

Mjesto

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predavaonica F201, II.kat

# Observation of different types of charge-current-induced spin polarization in $\text{BiSbTeSe}_2$ topological insulators

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The surface states of 3D topological insulators (TIs) possess a helical spin texture in which the spin and momentum are perpendicularly locked to each other. Due to this spin-momentum locking, a net spin polarization can be induced by a charge current and vice versa. However, topological surface states are expected to give rise to only one type of spin polarization for a given current direction, which has been a limiting factor for spin manipulations. In this talk we report that in devices based on the bulk-insulating topological insulator  $\text{BiSbTeSe}_2$ , an unexpected switching of spin polarization was observed upon changing the chemical potential. The spin polarization expected from the topological surface states was detected in a heavily electron-doped device, whereas the opposite polarization was reproducibly observed in devices with low carrier densities. We propose that the latter type of spin polarization stems from topologically-trivial two-dimensional states with a large Rashba spin splitting, which are caused by a strong band bending at the surface of  $\text{BiSbTeSe}_2$  beneath the ferromagnetic electrode used as a spin detector. This finding paves the way for realizing the "spin transistor" operation in future topological spintronic devices.

Voditelji seminara FO  
Damir Pajić i Ivica Smolić