Abstract Submitted
for the MAR16 Meeting of
The American Physical Society

Proximity induced exchange interaction in graphene-YIG devices[1] JOHANNES CHRISTIAN LEUTENANTSMEYER, ALEXEY KAVERZIN, MAGDALENA WOJTASZEK, BART J. VAN WEES, University of Groningen, PHYSICS OF NANODEVICES TEAM — The proximity of two materials with radically different properties can give rise to a new physical phenomenon present only in the direct vicinity to the interface. Graphene is a perfect candidate for observing proximity effects as being ultimately thin and therefore ultimately sensitive for such interactions. Ferromagnetism is one of the desired properties for spintronics applications of graphene. It is absent in the pristine state, however, one can artificially induce magnetic ordering by bringing graphene in the proximity of ferrimagnetic insulating material, such as yttrium iron garnet (YIG). In this work we show that a monolayer of graphene placed on top of YIG adopts the exchange interaction induced by YIG and thus becomes ferromagnetic even at room temperatures. The proximity induced exchange interaction results in an effective magnetic field that influences directly the spin transport in graphene seen in a spin precession measurements. We are able to fit the measured Hanle dependences with extended solutions of Bloch diffusion equations and extract the value of the effective exchange field that is around 200 mT. Our findings open up a new route for creating novel all graphene in plane spin valve devices for spintronics applications.

[1]European Unions Seventh Framework Programme n607904-13 Spinograph, n604391 Graphene Flagship, FOM, ZIAM

Alexey Kaverzin
Univ of Groningen

Date submitted: 14 Jan 2016 Electronic form version 1.4