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Ferromagnet proximity effect in graphene bilayer[1] YURIY SEMENOV, North Carolina State University, JOHN ZAVADA, U.S. Army Research Office, KI WOOK KIM, North Carolina State University — A well-known effect of ferromagnet proximity in metallic thin film results in the giant magneto-resistance (GMR). In case of graphene monolayer, the effect of dielectric ferromagnet layer (DFL) proximity leads to formation of spin-dependent electron potential and electron spin rotation in effective exchange field. We theoretically consider the ferromagnet proximity effect in graphene bilayer (GBL), where bottom and top layers are affected by arbitrary oriented DFL. Our calculations show a drastic reconstruction of energy band structure with the top DFL magnetization rotation compared to the bottom one, which is assumed to be fixed by an antiferromagnetic substrate. If the top and bottom magnetic moments are parallel and equal, we obtain a simple spin split gapless band structure. As soon as symmetry between the top and the bottom GBL is broken by rotation of top DFL magnetization, the gap is opening; it reaches the magnitude of exchange field at antiparallel configuration. Calculated conductivity of GBL strongly depends on magnetic configuration demonstrating efficiency of the new mechanism of GMR.

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