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Theory of the inverse Faraday effect driven by non-coplanar spin structures KATSUHISA TAGUCHI, GEN TATARA, Tokyo Metropolitan University — We show theoretically that a new mechanism of the inverse Faraday effect exists in the presence of non-coplanar spin structures in metals even without the spin-orbit interaction. The spin density generated by the effect is proportional to the circular polarization of the light, $(\mathcal{E} \times \mathcal{E}^*)$ ($\mathcal{E}$ is the complex amplitude vector of the electric field of the circular light), and $\nabla \times \mathbf{j}_{\rm s}^{\alpha}$, where $\mathbf{j}_{\rm s}^{\alpha} \equiv (\mathbf{n} \times \nabla \mathbf{n})^{\alpha}$ is the spin current carried by the spin structure ($\mathbf{n}$ is the unit vector of the localized spin). The effect turns out to be larger than the conventional inverse Faraday effect, and the present mechanism is expected to be useful for the magnetization flip of the Skyrmion.

Katsuhisa Taguchi
Tokyo Metropolitan University

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