Post-Periastron Gamma Ray Flare from PSR B1259-63/LS 2883 as a Result of Comptonization of the Cold Pulsar Wind

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We argue that the bright flare of the binary pulsar \object{PSR B1259$-$63/LS2883} detected by the {\it Fermi} Large Area Telescope (LAT), is due to the inverse Compton (IC) scattering of the unshocked electron-positron pulsar wind with a Lorentz factor $\Gamma_0 \approx 10^4$. The combination of two effects both linked to the circumstellar disk (CD), is a key element in the proposed model. The first effect is related to the impact of the surrounding medium on the termination of the pulsar wind. Inside the disk, the "early" termination of the wind results in suppression of its gamma-ray luminosity. When the pulsar escapes the disk, the conditions for termination of the wind undergo significant changes. This would lead to a dramatic increase of the pulsar wind zone, and thus to the proportional increase of the gamma-ray flux. On the other hand, if the parts of the CD disturbed by the pulsar can supply infrared photons of density high enough for efficient Comptonization of the wind, almost the entire kinetic energy of the pulsar wind would be converted to radiation, thus the gamma-ray luminosity of the wind could approach to the level of the pulsar's spin-down luminosity as reported by the {\it Fermi} collaboration.

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