

## MECHANISMS OF SOLAR FLARES

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Solar flares are characterized by impulsive release of considerable energy in the form of electromagnetic and corpuscular radiation-solar cosmic rays as well as by coronal mass ejections (CMEs). However, recent investigations indicate the presence of flares that are not associated with observable CMEs. The energy of a large solar flare hundreds times exceeds the reserves of chemical energy (coal, oil, gas) of the Earth. Flare development is usually being connected with magnetic field reconnection in region of the solar chromosphere and corona above sun-spots where strong magnetic fields with a tension up to 3000 Gs exist: such magnetic fields in sun-spots ensure solar flare energetics observed. At the same time coronagraphic observations by SOLWIND, SMM and SOHO space missions in the last decade revealed more than 1500 new comets, passing very closely to the Sun, so called sungrazers and sunstrikers. Recent theoretical investigations on the evolution of cometary nuclei in the solar atmosphere, carried out taking into account aerodynamic fragmentation and transversal expansion of the fragmented mass, indicate the possibility of generation of solar flares due to explosive release of the kinetic energy of nuclei of comets, sunstrikers, near the solar photosphere. The energetics of such impact-initiated solar photospheric flare corresponds to that observed during large solar flares at cometary nuclei masses of the order of mass of the nucleus of Comet Halley. Synchronic observations of sunstriking comets and solar activity are important for further understanding of solar flare mechanisms. 1. COSPAR Inform. Bull. 1998, 142, 21 // [http://sohowww.nascom.nasa.gov/hotshots/2008\\_06\\_23/](http://sohowww.nascom.nasa.gov/hotshots/2008_06_23/) ; 2. Gopalswamy N., Akiyama S., Yashiro S. Major solar flares without coronal mass ejections // IAU Symposium No. 257 "Universal Heliophysical Processes " Abstracts, Ioannina, Greece, 2008, p. 12 // [http://iau257.uoi.gr/submitted\\_abstracts/](http://iau257.uoi.gr/submitted_abstracts/) ; 3. Hale G.E. On the probable existence of a magnetic field in sun-spots // Astrophys. J. 1908, v. 28, No. 4, pp. 315-343; 4. Ibodov S., Ibodov F.S., Grigorian S.S. Explosion of sungrazing comets in the solar atmosphere and solar flares // Proc. IAU Symposium No. 257, N. Gopalswamy and D.F. Webb, Eds, Cambridge University Press, 2009, pp. 341-343; 5. Somov B.V. Physical Processes in Solar Flares // Kluwer Academic Publishers, Dordrecht/Boston/London, 1992, 249 p.; 6. Sweet P.A. Mechanisms of solar flares // Ann. Rev. Astron. Astrophys. 1969, v. 7, p. 149-176.

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