

Homework 4: Solar Eruption

Xudong Sun (UH/IfA)

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1 Solar Eruption Order-of-Magnitude

Show your rationale for the following questions.

- (a) From the [continuum image](#), **ESTIMATE** the fractional area (with respect to the solar hemispheric area) of active region 12192 and its unsigned magnetic flux (in Mx, i.e. $G\text{ cm}^2$).
- (b) **ESTIMATE** the energy content of a large solar eruption (in erg).
- (c) Some low-mass stars can produce large spots and “super flares”. For a star with solar radius and a spot group covering 10% of its hemisphere, **ESTIMATE** the energy content of its eruption (in erg).
- (d) **ESTIMATE** the Sun-Earth travel time of: flare emission, energetic particles, bulk plasma in coronal mass ejection, and ambient solar wind.

2 Grand Archive of Flare and CME Cartoons

Solar physicists are known for their artistic creativity. Dr. Hugh Hudson has gathered [over 400 cartoons](#) from literature regarding flare and CME processes.

SELECT one cartoon that interests you, **BROWSE** the relevant paper, and **WRITE** a short summary (~100 words). You do not have to agree with the paper’s conclusions.