ASTROPHYSICAL ASPECTS IN THE STUDIES OF SOLAR COSMIC RAYS (REVIEW)

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This extended review contains available observational data and recent theoretical results concerning general astrophysical aspects of particle acceleration at/near the Sun and extreme potentialities of the solar accelerator(s):
1. Largest proton events and upper limit spectrum (ULS) for solar cosmic rays (SCR).
2. Maximum SCR energy (rigidity), E_m (R_m), in modern acceleration models.
3. Production of flare neutrinos and their detection probability.
4. Relative share of solar flare energy released in the form of SCR.
5. Gamma rays, charge states and elemental abundance of accelerated solar ions and diagnostics of astrophysical plasmas.
6. Structure (extension) of coronal magnetic fields and proton acceleration to energies of $E_m \geq$ 100 GeV.
7. Magnetic reconnection in acceleration scenarios.
8. Size (frequency) distributions of solar proton events (SPE) and stellar flares.
9. Occurrence probability of gigantic flares of the February 23, 1956 type.