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Target luminosity and luminosity integral achievement at VEPP-2000 collider

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VEPP-2000 electron-positron collider operating in the beam energy range of 150-1000 MeV is the only machine originally designed to exploit Round Beams Concept which results in significant beam-beam limit enhancement. After long shutdown for injection chain upgrade VEPP-2000 resumed data taking with luminosity limited only by beam-beam effects.

Thanks to extensive and thorough machine tuning the luminosity achieved $L = 9 \cdot 10^{31} \text{ cm}^{-2}\text{s}^{-1}$ at $E=900$ MeV that is above the design value. The stable operation resulted as well in high average data taking rate of 2-4 pb⁻¹/day at top energies.

In 2024 VEPP-2000 achieved the symbolic long-term milestone: integrated luminosity recorded by each of two detectors, SND and CMD-3, exceeded 1fb⁻¹. This value was the target data volume written in the project physical program. Recorded data allows to study physics of light quarks with unprecedented precision. Recently published by CMD-3 collaboration $e^+e^- \rightarrow \pi^+\pi^-$ cross-section measurement already changed the vision of muon anomalous magnetic dipole moment mystery - possible window to physics beyond the SM.

Footnotes

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