

Aging phenomena in the BESIII drift chamber

Tuesday 7 November 2023 09:25 (25 minutes)

As the main tracking detector of Beijing Spectrometer (BESIII), the multilayer drift chamber (MDC) is used to accurately measure the position and the momentum of the charged particles produced in $e^+ e^-$ collisions at Beijing Electron-Positron Collider (BEPCII), and meanwhile to test dE/dx information for particle identification.

MDC has been taking data since 2008. During about 15 years of operation, the chamber has worked stably with good performance, but it is suffering from aging issues due to beam related background. The gains of the cells in the first ten layers show a significant decrease, reaching a maximum decrease of about 50% for the first layer, and correspondingly, the spatial resolution and hit efficiency also show a degradation. What's more, the inner chamber of the MDC encountered Malter effect in January 2012. After some tests, about 0.2% water vapor was added to the gas mixture to solve this cathode aging problem. No Malter discharge has been observed since then. These aging monitoring and study provide important references for stable operation of the MDC and the upgrade of the inner chamber.

The aging effect of the BESIII drift chamber will be presented in this talk. The phenomena of Malter effect and the solution of this issue will also be shown.

Author: DONG, Mingyi

Co-authors: Dr WANG, Liangliang (IHEP, Beijing, China); WU, Linghui; OUYANG, Qun (Chinese Academy of Sciences (CN)); CHEN, Yuanbo; QIN, Zhonghua

Presenter: DONG, Mingyi

Session Classification: Ageing phenomena