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A high rate and high timing gaseous photodetector prototype with RPC structure

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In order to meet the requirements of high-rate and high time resolution in future high energy physics experiments, a prototype of gaseous photodetector with RPC structure was developed in this paper. The performance of the detector was simulated in Garfield++, and the single-photoelectron performance in different gases was tested using ultraviolet laser. The detector used a low resistivity ($\sim 1.4 \times 10^9 \Omega \cdot \text{cm}$) float glass, so that it has high-rate capability, the laser test results show that in MRPC gas, the single-photoelectron time resolution is best to reach ~ 20 ps at a gain of $\sim 7 \times 10^6$ Qe. This detector can quantitatively test the single-photoelectron performance of different gases, and will be used to find eco-friendly MRPC gases.

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