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Mechanical properties of the thin-walled welded straws for the COMET experiment

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In the technique of modern experiment on accelerators coordinate gas-filled wire detectors based on thin-walled tubes, straws, made of polyethylene terephthalate film are increasingly used. This type of detectors has numerous of advantages. To ensure high coordinate accuracy of the straw detector, the material from which the straw is made is also required to preserve its basic physical properties in time, as well as to be homogeneous throughout the length. The most important mechanical properties of the straw material are the area of elastic deformation, the value of the elastic modulus, which characterizes the straw strength, the rate of stress relaxation. Knowledge of the Poisson's ratio is required to select the straw initial tension, since its tension changes when operating in a vacuum.

The purpose of this work was to investigate the most important mechanical properties of the thin-walled welded straws developed by JINR (Joint Institute for Nuclear Research) COMET (COherent Muon to Electron Transition, J-PARK) group and to estimate straws lifetime as the main part of the COMET experiment tracking system. The design of the stand for studying the straw characteristics as well as the results of the measurements are given.

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