

Polymerconcrete for Radiation Background Shielding of Detectors at Hadron Colliders,

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S.L. ZAITSEV, ITEP - New shielding material, polymerconcrete, is developed. Its density is $1.2...3.6 \text{ g/cm}^3$ and the partial content of hydrogen and lithium (or boron) is, respectively, $4.9...6.6 \times 10^{22} \text{ H/cm}^3$ and $1.3 \times 10^{22} \text{ Li/cm}^3$ ($3.3 \times 10^{21} \text{ B/cm}^3$). The components: granulated polyethylene, lead powder, lithium salts (or boron carbide) are bound by the special cement solved with the liquid polymer. After irradiation, the material samples have the following characteristics: compression strength 42 MPa, tensile strength 6 MPa, dynamic coefficient of elasticity 1×10^3 . Radiation stability was measured at the reactor IBR-2 (JINR) and accelerators at IHEP, JINR, ITEP. The value is $1 \times 10^6 \text{ Gy}$ at $1 \text{E}0 \text{ Gy/s}$ and $1 \times 10^4 \text{ Gy}$ at $<1 \times 10^{-3} \text{ Gy/s}$ which satisfies the requirement of future colliders. Our experimental results demonstrate that the induced radioactivity is lower for the polymerconcrete than for the ordinary concrete. It is shown that the value of $3.2...3.6 \text{ g/cm}^3$ is the optimal density of the 'steel - polymerconcrete^a composition resulting in the minimal thickness and cost of the shielding. One can employ the polymerconcrete as bricks for masonry or cast it directly in some complex-shaped form. This material is suggested for use instead of CH_2 and Pb for the shieldings of D0 and CDF at Tevatron and CMS, ATLAS, ALICE at LHC.