Abstract Submitted
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Cylindrical shock waves and dynamic phenomena induced in solids by intense proton beams[1] ALESSANDRO BERTARELLI, FEDERICO CARRA, ALESSANDRO DALLOCCHIO, MICHAEL GUINCHARD, NICOLA MARIANI, LORENZO PERONI, STEFANO REDAELLI, MARTINA SCAPIN, None — The accidental impact of hadron beams on matter can induce intense shockwaves along with complex dynamic phenomena (phase transitions, extended density changes, explosions and fragment projections). These events have been successfully modeled resorting to wave propagation codes; to produce accurate results, however, these programs require reliable material constitutive models that are often scarce and inaccurate. A complex and innovative experiment was carried out at CERN to benchmark existing material constitutive models and possibly derive new ones. The test setup, aimed at the characterization of six different materials impacted by 440 GeV intense proton pulses, allowed to generate cylindrical shockwaves on material specimens and to observe the effects induced by their propagation. This method, a combination between numerical simulations and an experimental technique, permitting to tune the intensity, location and timing of the beam-deposited energy, may allow to study the effects induced by internal, quasi-instantaneous loadings in domains well beyond particle physics (accidents in nuclear facilities, internal explosions, high pressure blasts etc.), particularly when relatively little explored cylindrical shockwaves are generated.

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