

## Special Issue on **Structural and Wave Propagation Effects in High-Energy Particle Impacts**

# CALL FOR PAPERS

When subatomic particles or ions interact with matter, they tend to transfer part of their energy to the medium they traverse. The energy deposited in the material produces a dynamic response of the structure, entailing stress waves and vibrations, or even the failure of the component, with effects comparable to a simultaneous action of dynamic mechanical and thermal loads. These phenomena may severely affect the integrity and functionality of the impacted equipment. The correct understanding and prediction of beam-induced shock and damage is therefore extremely important in the design of any component exposed to direct interaction with intense and energetic particle beams. However, it could also be of inspiration for many other civil and aerospace applications in which the structures are subjected to similar scenarios, such as mechanical and high-velocity impacts, explosions, or thermally induced vibrations. Moreover, impacts with high-energy particle beams allow researchers to investigate material behavior in extreme conditions that cannot be replicated with laboratory-controlled experiments. For example, the HiRadMat facility at the European Organization for Nuclear Research (CERN) could potentially be a useful tool for the shock community to validate theoretical and numerical models and to evaluate the structural integrity of components, with potential applications not strictly related to the particle accelerator field.

This special issue aims to publish original research in the field of high-energy particle beam interaction from a shock and vibration perspective. Papers concerning the assessment of induced shockwaves and their structural effects on mechanical components will be considered. Contributions that discuss the development and validation of experiments, alongside analytical and numerical tools for the analysis of wave propagation and dynamic loading scenarios, are particularly welcome. This special issue also encourages researchers to submit review articles that overview the state of the art and seek to stimulate and support continuing efforts in studying the macroscale mechanical and hydrodynamic responses induced on materials and in evaluating structural integrity.

Potential topics include but are not limited to the following:

- ▶ Mechanics and behaviors of materials in high-energy impacts from a shock and vibration perspective
- ▶ Analysis of elastoplastic shock wave generation and propagation in matter
- ▶ Modeling and simulation of structural effects during particle beam interaction with matter
- ▶ Development and validation of novel material models and/or equations of state for high-energy impact applications from a shock and vibration perspective
- ▶ Development of innovative experimental techniques for testing and characterizing materials and structures under extreme shock conditions
- ▶ Data acquisition and signal processing in high-energy impact and shock experiments

Authors can submit their manuscripts through the Manuscript Tracking System at <https://mts.hindawi.com/submit/journals/sv/dpypi/>.

Papers are published upon acceptance, regardless of the Special Issue publication date.

### Lead Guest Editor

Martina Scapin, Politecnico di Torino, Turin, Italy  
*martina.scapin@polito.it*

### Guest Editors

Marilena Tomut, GSI, Darmstadt, Germany  
*m.tomut@gsi.de*

Alessandro Bertarelli, CERN, Geneva, Switzerland  
*alessandro.bertarelli@cern.ch*

L. Peroni, Politecnico di Torino, Turin, Italy  
*lorenzo.peroni@polito.it*

Nicholas J. Sammut, L-Università ta' Malta, Valletta, Malta  
*nicholas.sammut@um.edu.mt*

### Submission Deadline

Friday, 11 September 2020

### Publication Date

January 2021