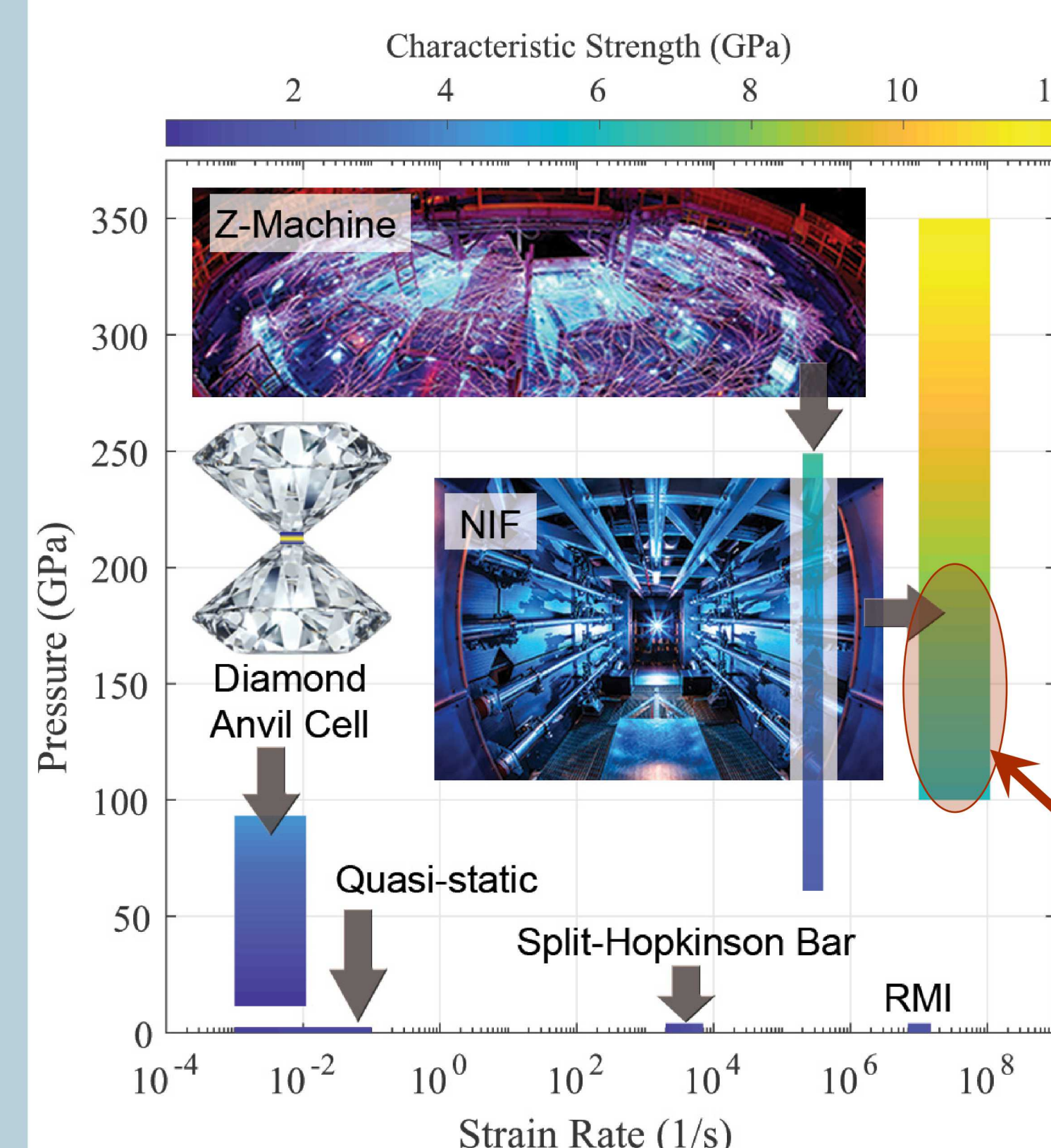


Ta Strength at Ultrahigh Pressures and Strain Rates Using Thin Film Graded Density Impactors

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Introduction

A comprehensive understanding of Ta strength across a broad range of conditions requires cross-platform validation.



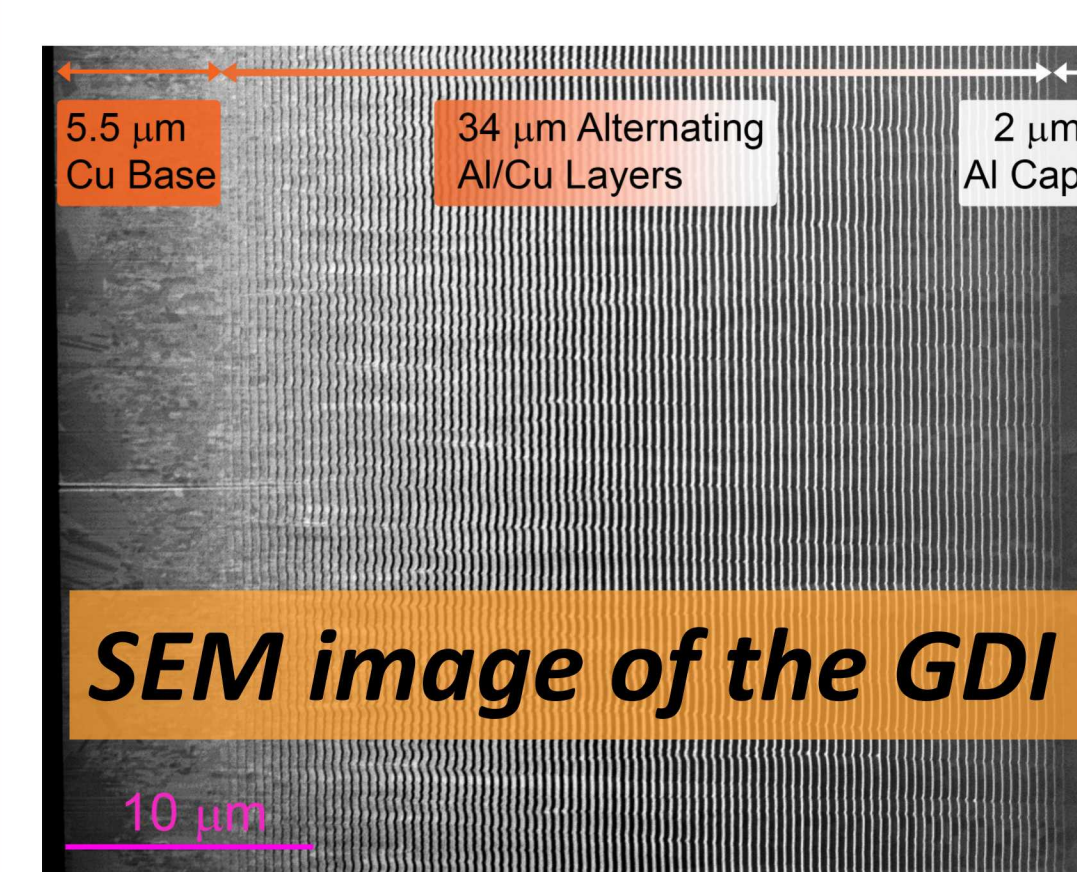
We have developed a novel technique to investigate material strength at high pressures and high strain rates.

Target regime for these experiments

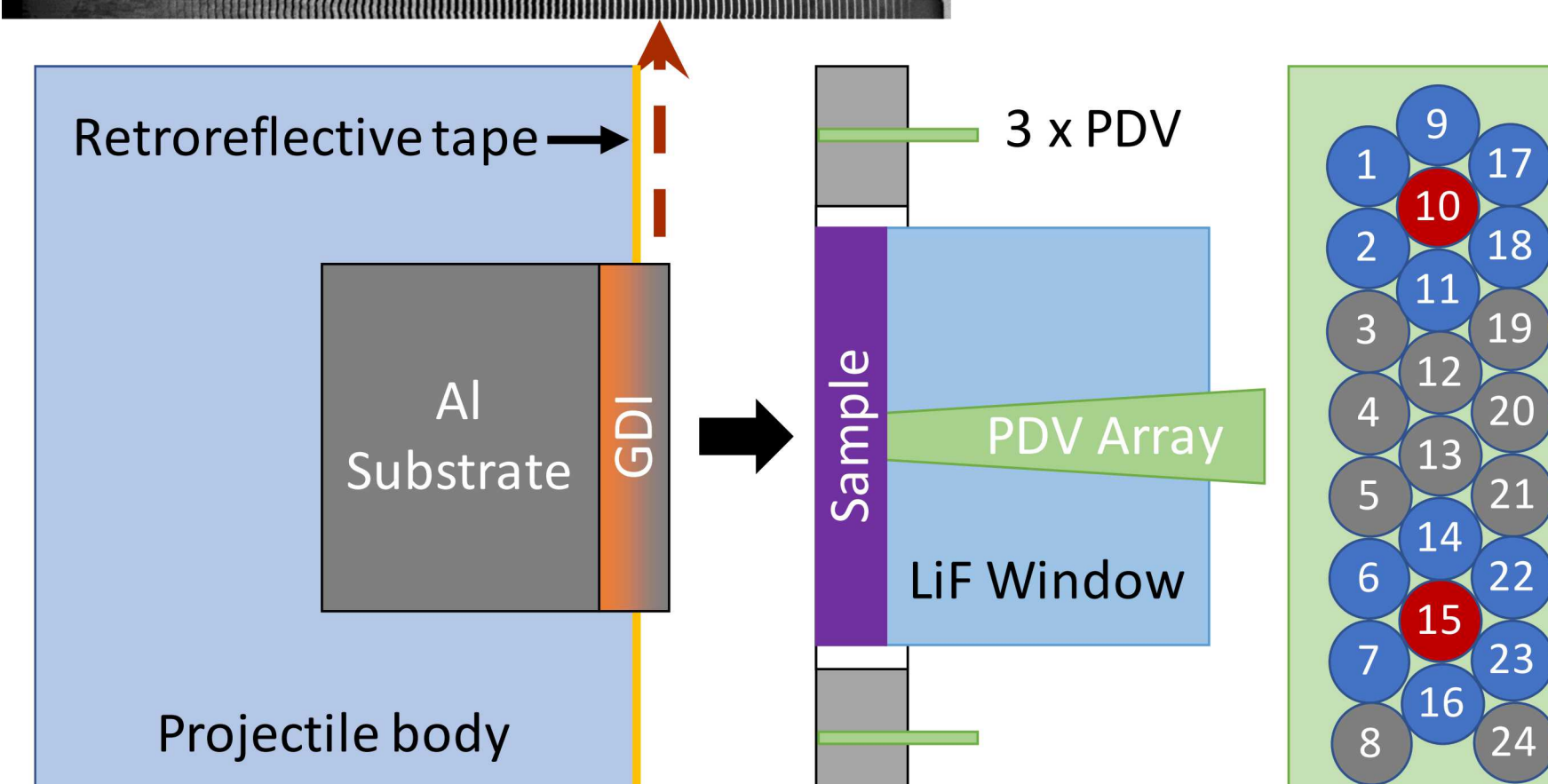
Approach

Sputter deposition is used to apply nm thick layers of alternating Al and Cu to provide an effective density gradient. This film is then used as an impactor in a plate-impact experiment to generate a shock-ramp-release loading profile.

Experimental Configuration

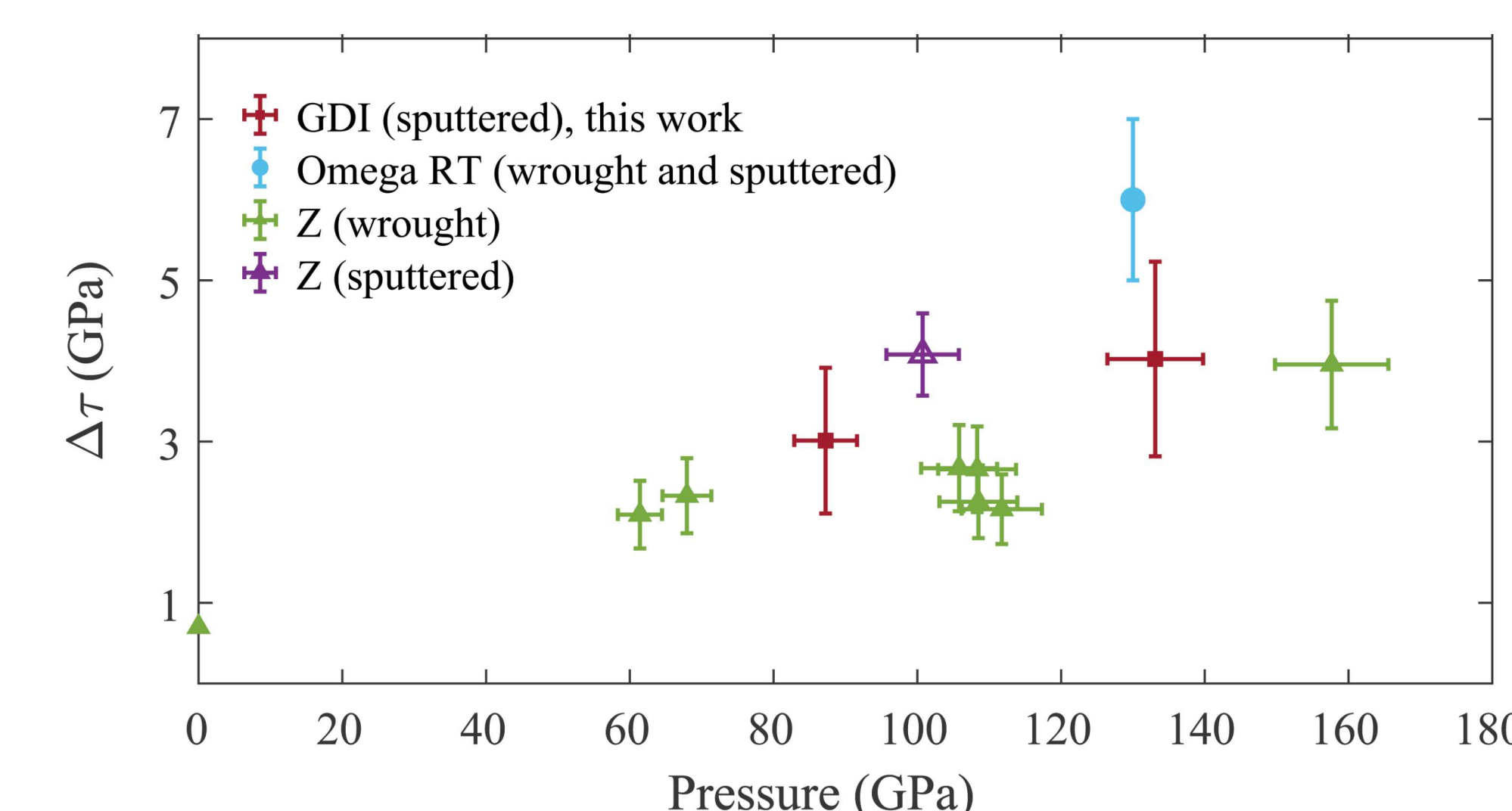
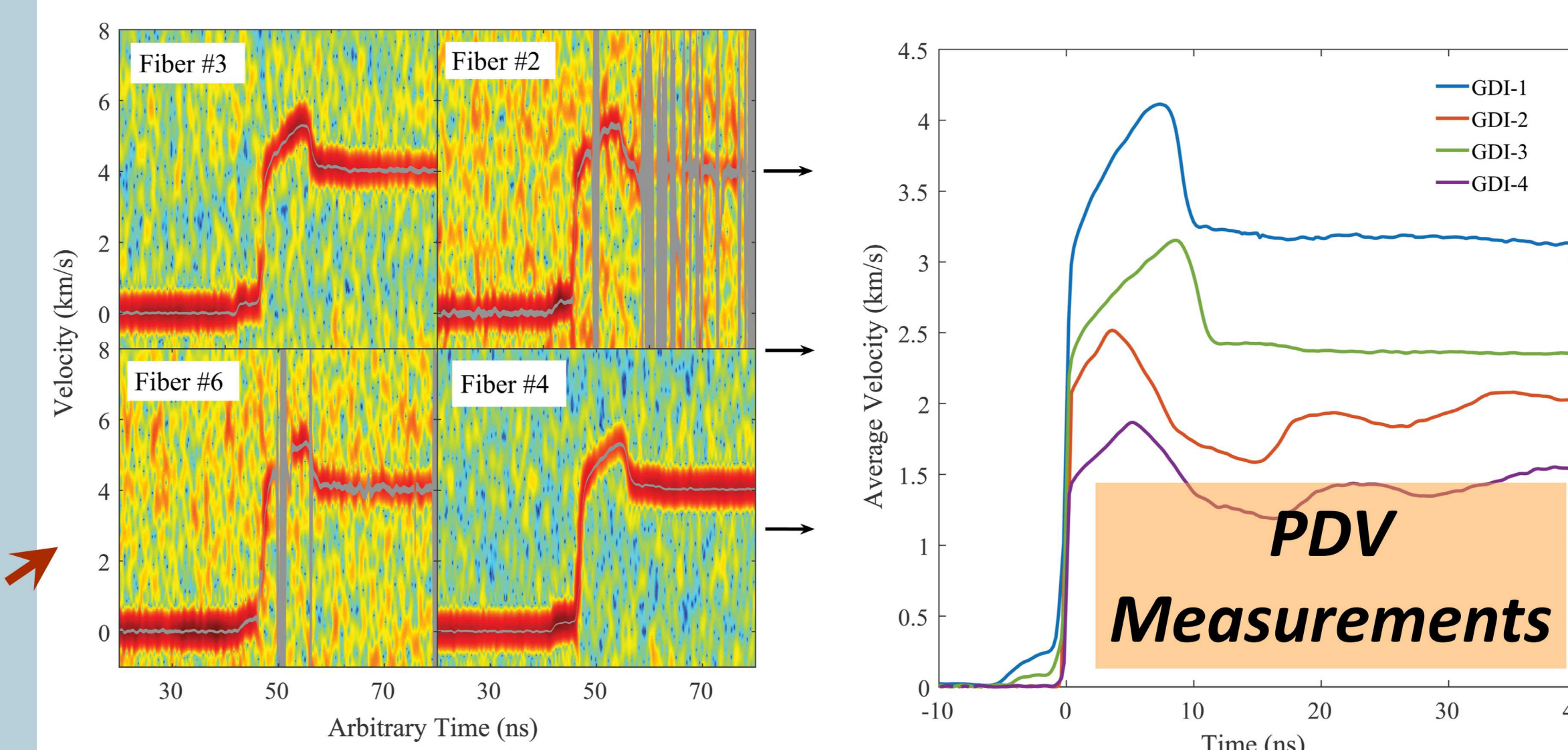


A 2-stage light gas gun was used to launch the GDIs into a thin (40 μm) Ta sample.

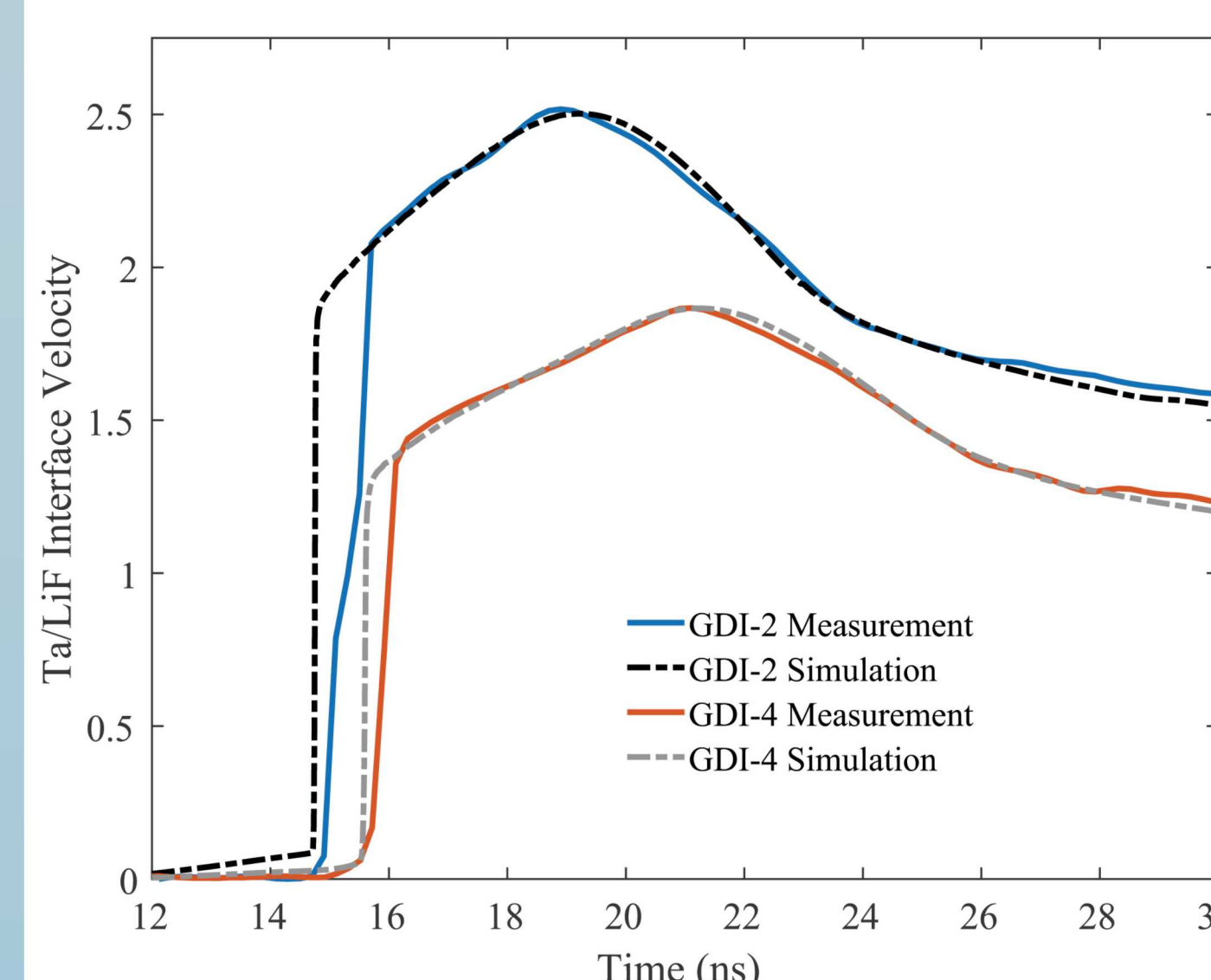


New PDV Probe

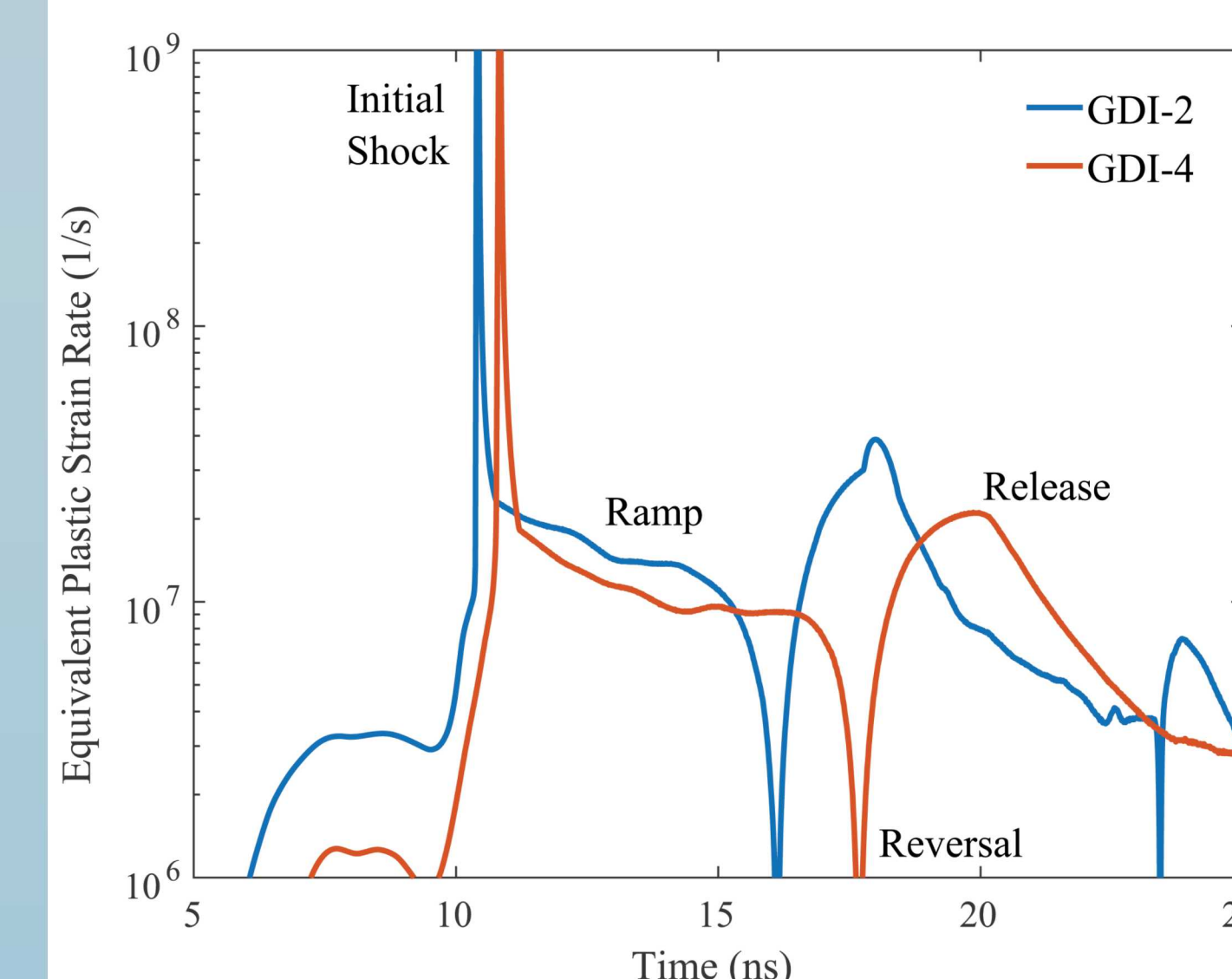
Results



Simulations



The GDI build was imported directly into Alegra, resulting in a predictive mesoscale simulation capability.



Strength estimates were extracted from the measured velocities and are in good agreement with other platforms.