



# Adaptive Multilevel Monte-Carlo Methods for Elliptic Problems with Uncertain Coefficients

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QUIET

July 18-22, 2017, Trieste

July 19-20, 2017

▶ **Problems we solve**

(Uniformly) elliptic variational inequalities with random input data

$$u(\omega) \in K : a(\omega; u(\omega), v - u(\omega)) \geq \ell(\omega; v - u(\omega)) \quad \forall v \in K, \quad \omega \in \Omega,$$

$K \subset H$  - closed, convex

▶ **Adaptive MLMC** for estimating  $\mathbb{E}[u]$

Multilevel Monte-Carlo methods + spatial adaptivity for solving PDEs

- Analysis
- Numerical tests for an obstacle problem

▶ **Application**

Simulation of wear tests for knee implants  
(3d contact problem with uncertainties)