N<sub>2</sub> / 6-31G (10e, 16o) bond length 1.2 Å LUCJ heavy-hex UCJ 10-2 Loss function Loss function  $10^{-2}$ 10<sup>-3</sup>  $10^{-4}$ 2 10 8 2 8 10 4 4 Repetitions Repetitions  $10^{1}$  $10^{1}$ VQE **VQE** Energy error (Hartree) Energy error (Hartree) 10<sup>0</sup> 10<sup>0</sup> 10-1  $10^{-1}$  $10^{-2}$  $10^{-2}$ 10 10 2 2 8 8 4 4 6 Repetitions Repetitions 10<sup>0</sup> 10<sup>0</sup> **QSCI QSCI** Energy error (Hartree) Energy error (Hartree)  $10^{-1}$  $10^{-1}$  $10^{-2}$  $10^{-2}$ 10<sup>-3</sup> 10<sup>-3</sup> 10 2 2 10 8 6 8 4 6 4 Repetitions Repetitions full compressed without multi-stage optimization truncated compressed