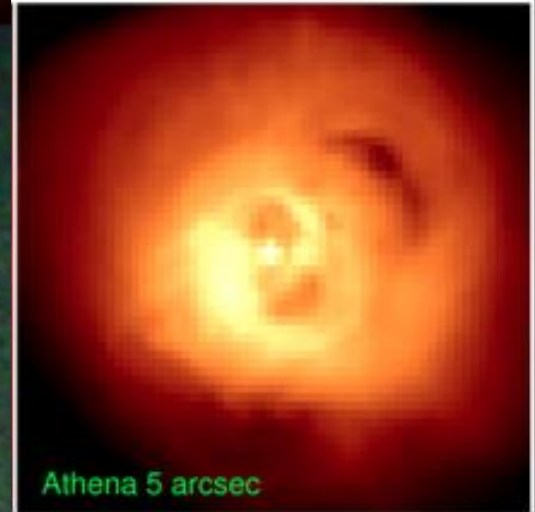
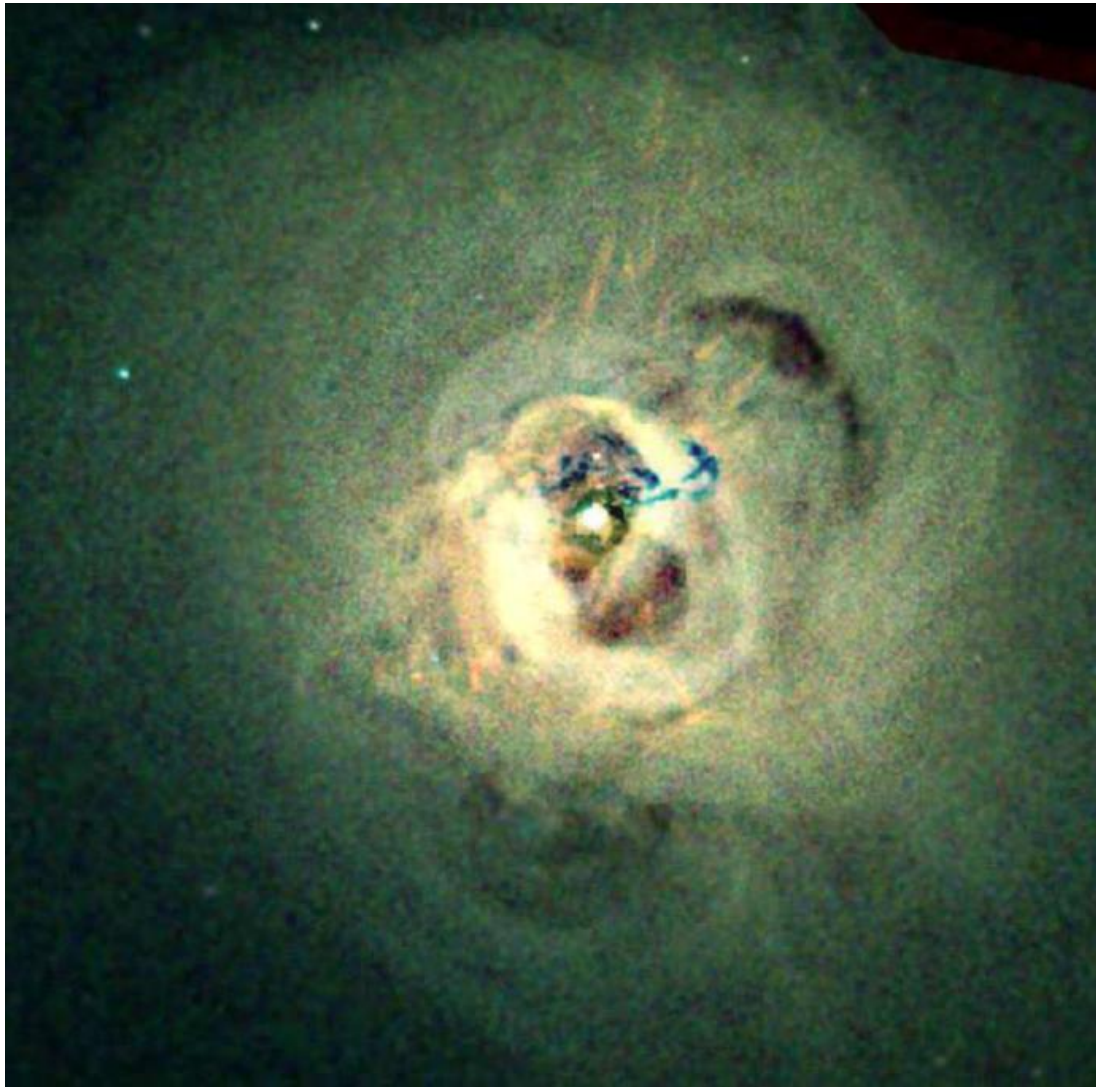


N-CAL Angular Resolution



NGC 1275 IN THE CORE OF THE PERSEUS CLUSTER

SMART-X: Piezo-controlled X-ray Optics

(PI A. Viklinin, P.S. P. Reid,....Application Scientists: V. Cotroneo)

About 20x Chandra area, Chandra-class PSF

- Demonstrating Piezo Optics comes first

~Need TRL 4 by 2015

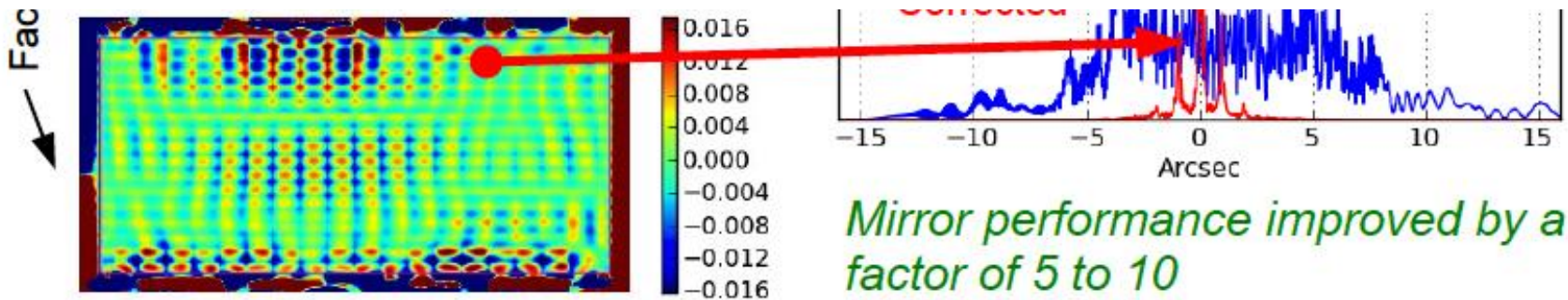
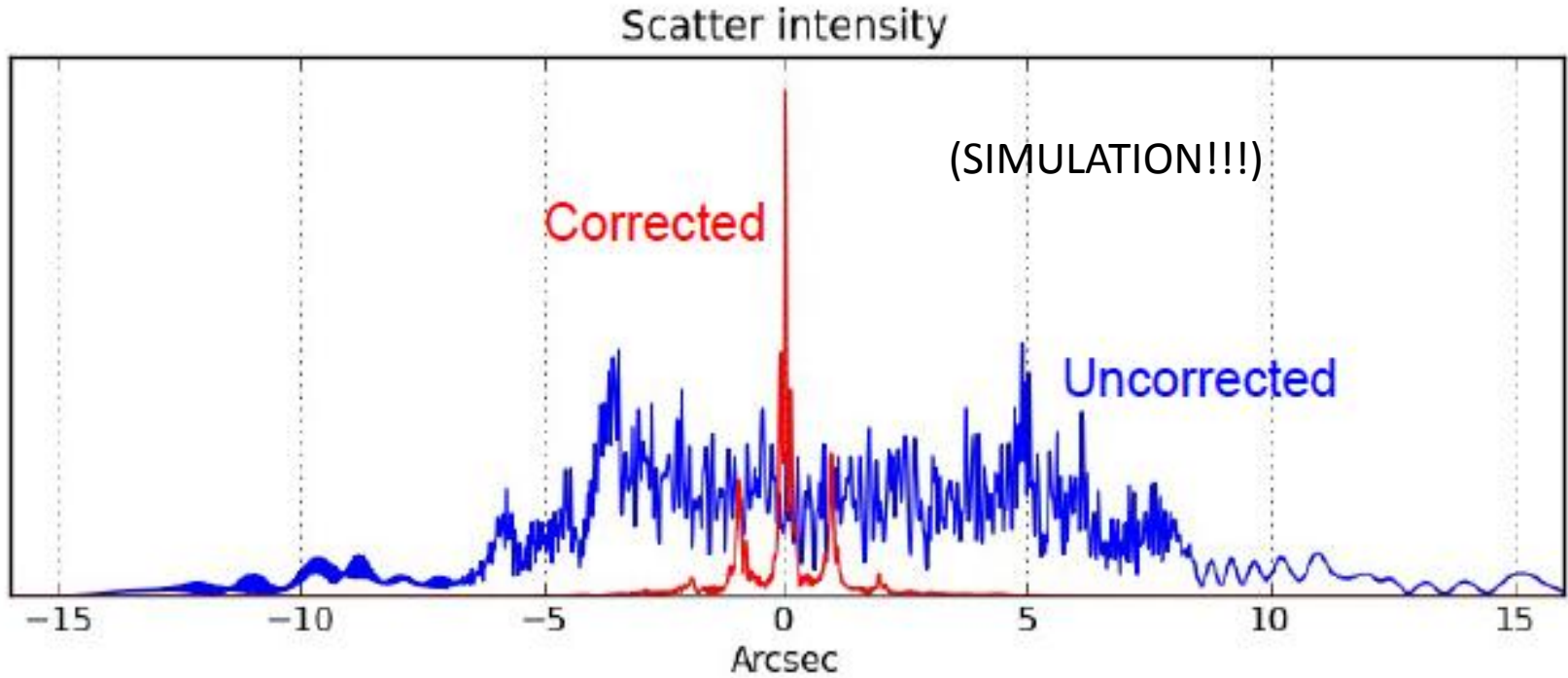
- Lab tests promising
- Simulations looking good
- Timeline: 2030

- **Technology:** Slumped foils Adjustable with piezo
- **Question:** is this approach competitive with direct polishing of thin shells?

In a nutshell

400mm x 200mm mirror segment
with 20 x 20 grid of piezoelectric actuators

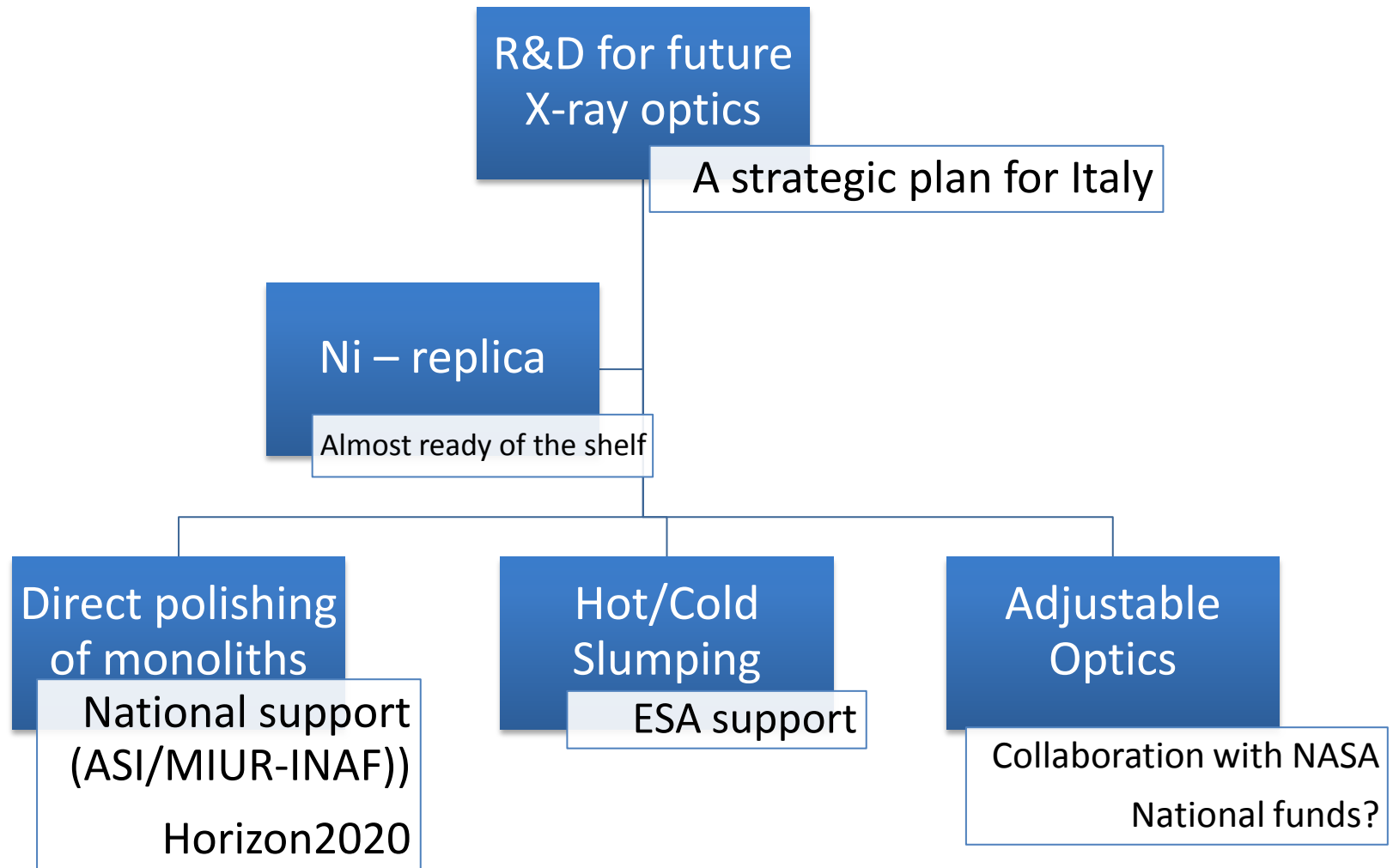
“Mirror performance improvable by factor 5-10”



Mirror performance improved by a factor of 5 to 10

ROADMAP (for Italy):

a preliminary & tentative approach [1]



ROADMAP (for Italy):

a preliminary & tentative approach [2]

- 1. Direct polishing of monoliths
 - Targets: WFXT-like or other imaging mission with <5 or $\ll 5$ arcsec HEW (super-Chandra)
 - Main improvements: bonnet polishing in Italy, Metrology of the internal side of the shell, ion-figuring
 - Goal: 3 shells representative prototype
 - Funds: ASI or premiale MIUR/INAF (1.5 MEuro in 2 years) or Horizon 2020 or ESA Triangular Initiative

ROADMAP (for Italy):

a preliminary & tentative approach [3]

- 2. Slumping of thin glass foils
 - Targets: IXO-like mission in Europe, NHXG-like mission in Europe
 - Main improvements: production in Italy of moulds, assessment of the slumping process, production of a fully representative prototype (TRL6)
 - Funds: ESA Possible IXO glass optics contract #2 (2 MEuro in 3 years)

ROADMAP (for Italy):

a preliminary & tentative approach [4]

- 2. Adjustable optics
 - Target: collaboration with CfA for SMART-X
 - Main task: production in Italy of thin foils for technology demonstrators (to be realized at CfA), contribution to the development of the adjustable optics, study & development of structures
 - Funds: if the second ESA contract is finalized, 300 KEuro in 3 years