

International  
Muon Collider  
Collaboration

# *Physics and Detector Working Groups*

By Massimo Casarsa, Sergo R. Jindariani, Simone Pagan Griso,  
Donatella Lucchesi, Fabio Maltoni, Federico Meloni, Nadia Pastrone,  
Cristina Riccardi, Lorenzo Sestini, Andrea Wulzer  
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## **Physics and Detector Working Group proposal**

**WG 1:** Physics Potential

**WG 2:** Detector performance and MDI

**WG 3:** Detector R&D and Software & Computing development

## WG 1: Physics Potential

**Mission:** Quantitatively assess the muon collider physics potential to advance knowledge by direct discoveries or precision

### Targets:

- SM predictions, Monte Carlo developments and new methodologies (e.g. VV scattering, ISR, ...)
- Precision physics Higgs/EW, top, ...
- Direct searches for new (heavy and light) particles, unconventional signatures, ...

### Tasks:

- Foster and collect community input on theory/pheno/Monte Carlo
- Physics analyses: from pheno projections, to full simulation, and back
  - Analyses based on full simulation and tuning of DELPHES
  - Impact on physics of Detector/Reconstruction/BIB
- Prepare common input Monte Carlo generation files

## WG 2: Detector performance and MDI

**Mission:** Develop a set of reconstruction algorithms to demonstrate that accurate physics observables can successfully be extracted from muon collider simulated data

### Targets:

- Development and optimization of detector configurations, shielding, event online selections and reconstruction algorithms to suppress beam-induced background
- Optimization of online and offline physics objects reconstruction algorithms

### Tasks:

- Develop reconstruction algorithms (online and/or offline) to analyze a baseline detector output in presence of beam-induced background by using detailed realistic simulation
- Evaluate physics objects reconstruction performance based on detailed detector simulation in realistic conditions
- Evaluate detector requirements/specifications and provide feedback to WG3 (R&D)

## WG 3: Detector R&D and Software & Computing development

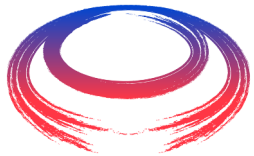
**Mission:** Develop detector design, DAQ strategy, and core software

### Targets:

- Evaluation of technological choices and defining R&D goals to meet physics requirements
- Development of the software and computing infrastructure to support WG1 and WG2 studies

### Tasks:

- Lab measurements and test beam campaigns to evaluate viable technological solutions and progress towards meeting detector requirements and data acquisition
- Development and deployment of core simulation and reconstruction software infrastructure
  - MT applications, container deployment, base OS choice
  - heterogeneous computing applications
- Organization of Monte Carlo production and configuration and associated storage management



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# Discussion