

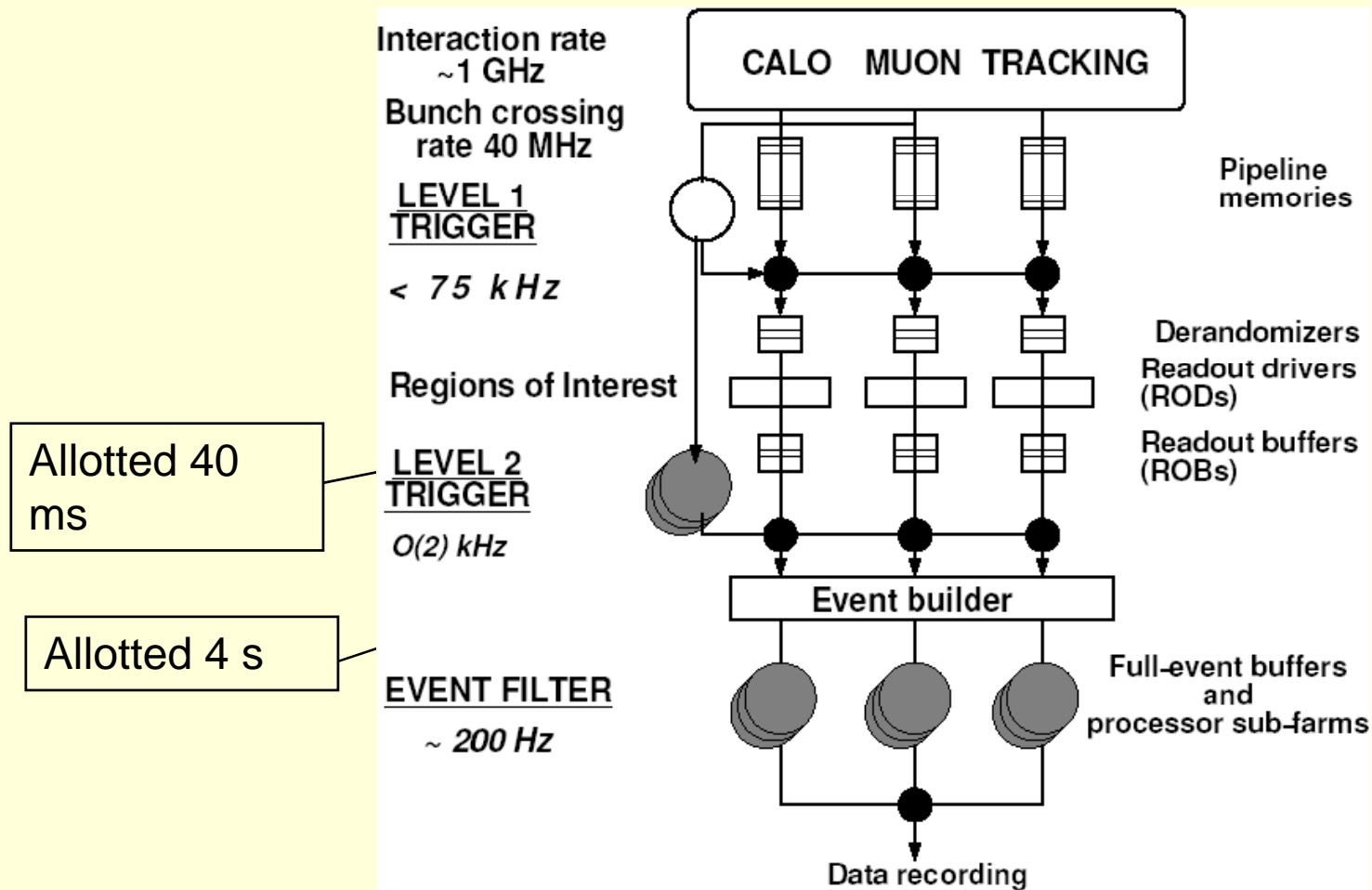
# Overlap Removal and Timing Optimization Studies

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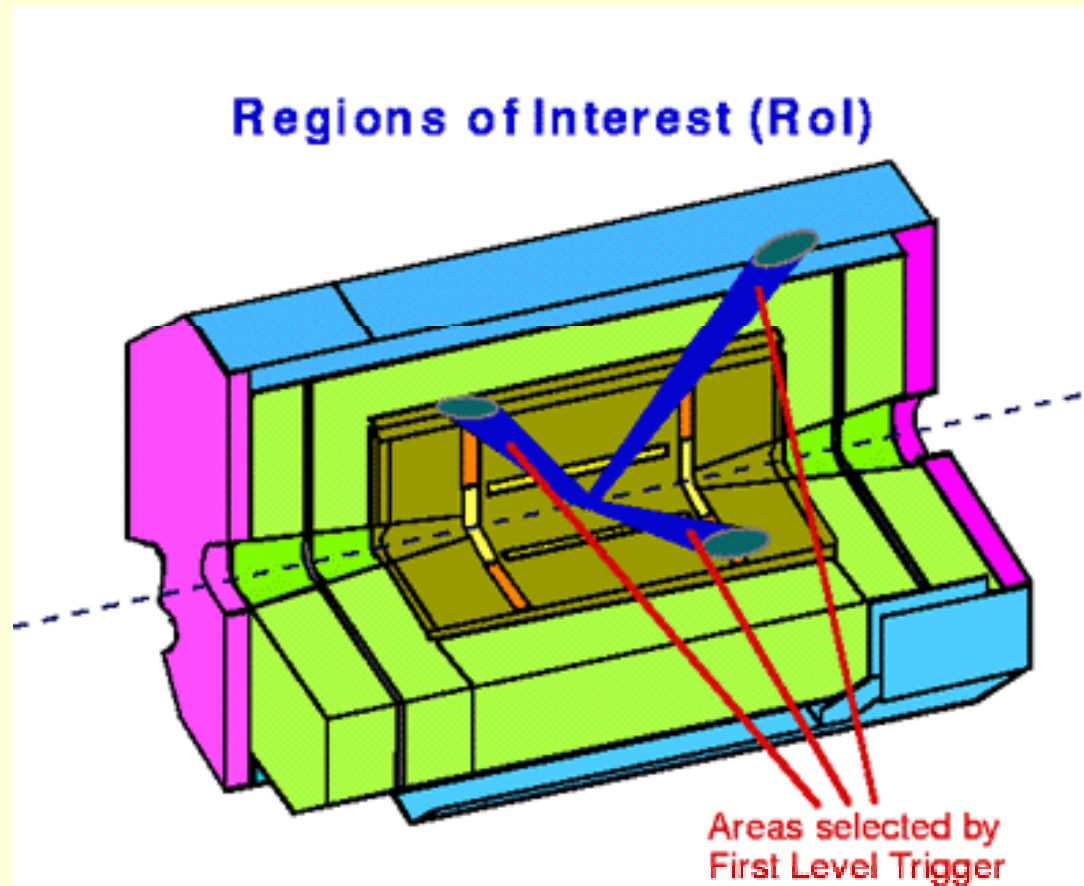
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Supervisor: Tomasz Bold

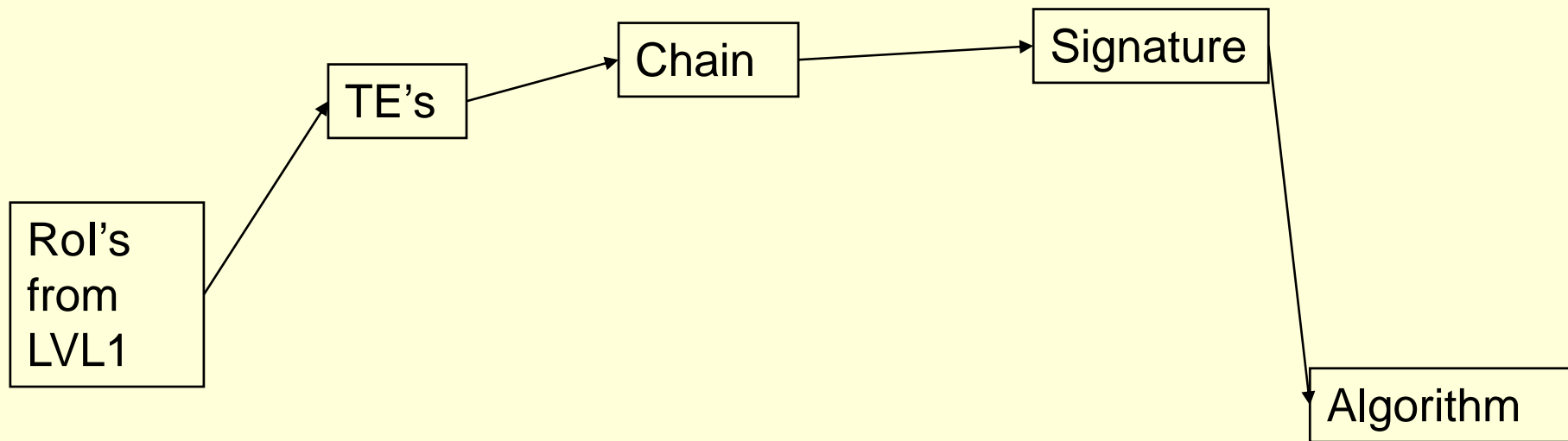
# ATLAS Trigger System



# Rol's in the LVL1 Detector



# HLT Selection Process



2 most Important Features:

- 1) Early Rejection Principle
- 2) Regions of Interest (RoI's)

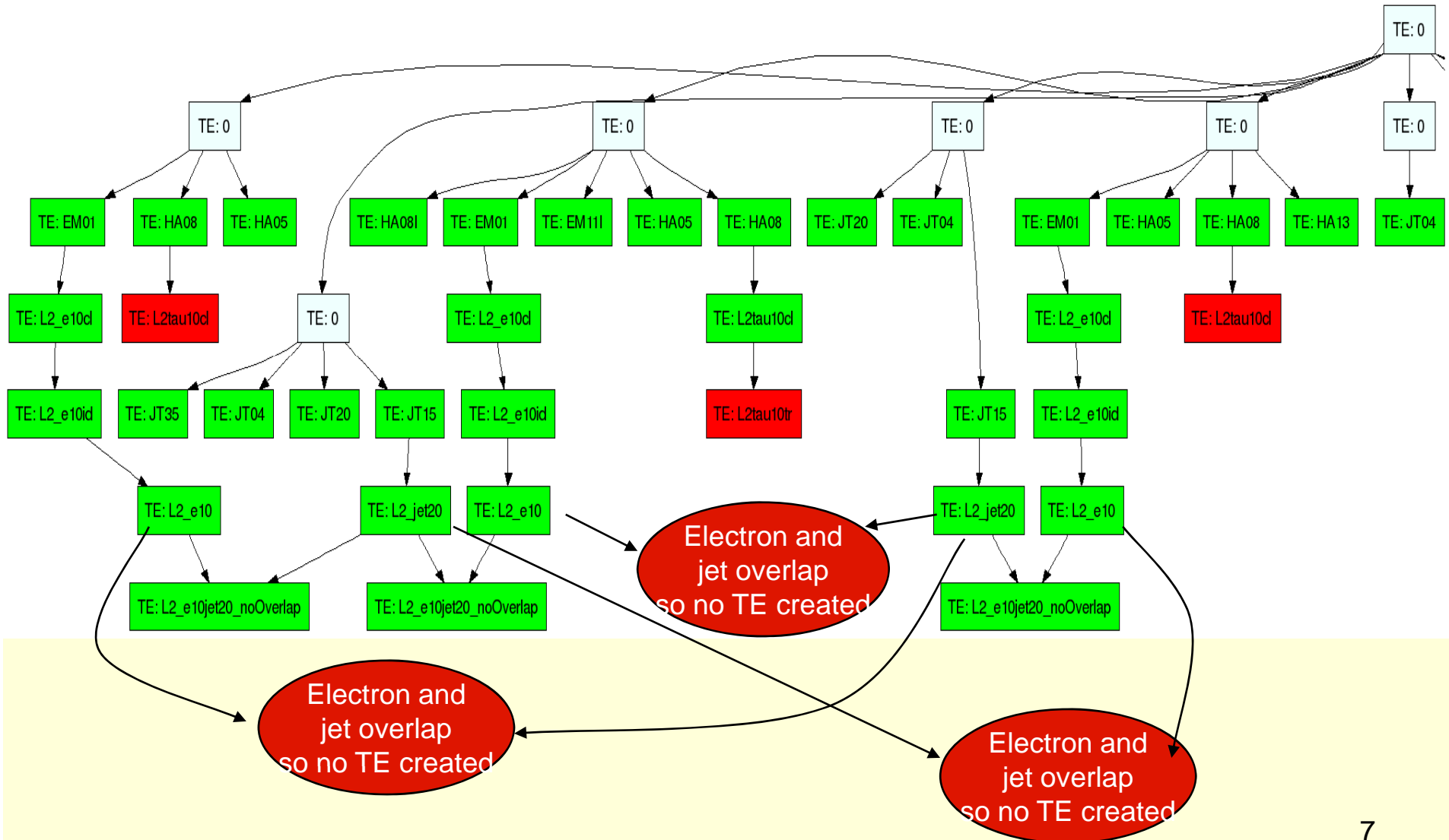
# Reason for the Overlap Algorithm

- If one wants a jet + electron in one event from the calorimeter, it is important when looking at the combined signature to make sure they come from different eta/phi
- If two TE's have exactly the same RoI eta/phi position, then they probably originated from the same cluster
- The chain needs to be stopped (since in reality, both TE's describe the same physical object)

# Basic Method

- ComboAlgo to compare 2 or more types
- Path:  
[offline/Trigger/TrigAlgorithms/TrigGenericAlgs/AlgoOverlap.h](#) (NEW PACKAGE!)
- Compare the actual center distance between two Rol's with a user-defined minimum center distance
- If the actual distance (of the specific TE's) is smaller, then the chain is stopped
- Otherwise, the chain continues

# Navigation Structure (w/o features) of 1 Event



# Extra Features: 1)

- Higher multiplicity Triggers can be handled by this algorithm
- e.g. with jet + electron + tau, the algorithm will compare jet, e; jet, tau; e, tau (within the same event)
- Given 3 TE, if one of the combinations fails (say jet, e), then the whole set will fail and no output TE will be created



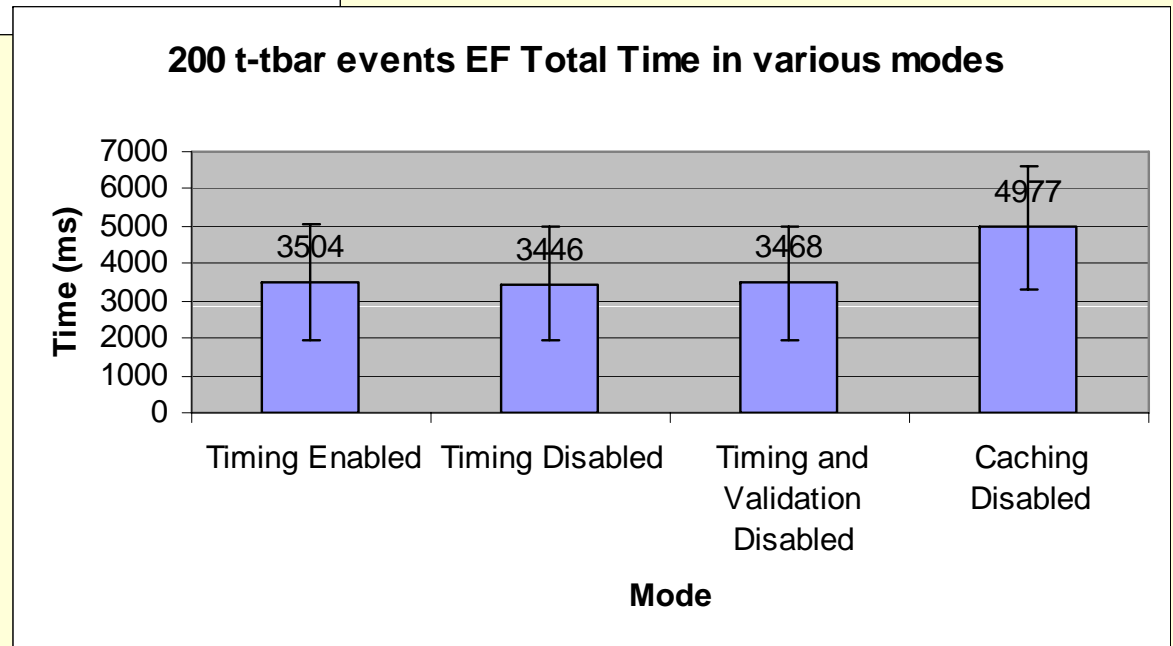
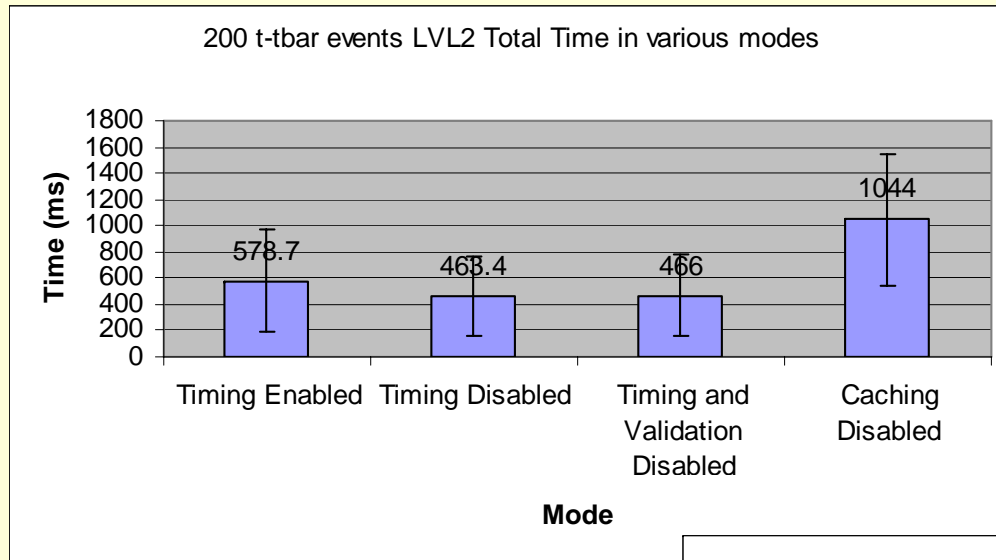
## Extra Features: 2)

- User can specify minimum eta and phi distances instead
- This allows for tighter control along one coordinate
- Algorithm rejects those pairs which have both actual eta and phi distances smaller than the user-defined mins

# Timing Studies 1: Overhead of timing, monitoring, and caching

- 4 Cases:
- 1) Timing & Validation Enabled
- 2) Timing Disabled/Validation Enabled
- 3) “Online Mode”: Timing & Validation Disabled
- 4) Caching Disabled, Timing & Validation Enabled

# Results



# Key Points

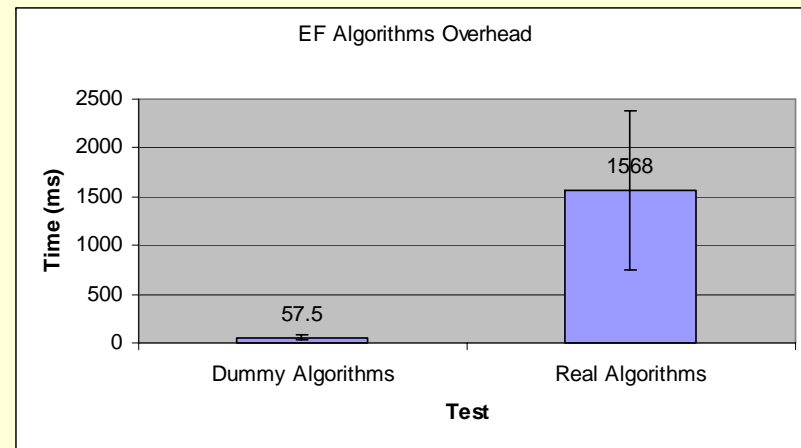
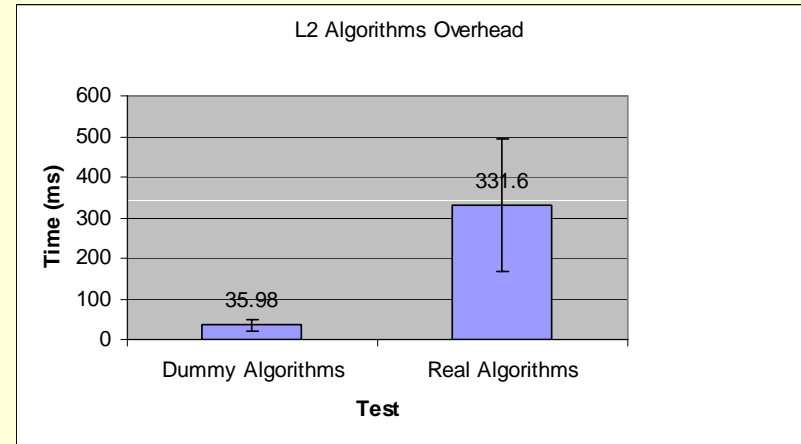
- Disabling the timers reduces consumption in LVL2 but not in EF
- Disabling monitoring does not seem to have an effect
- Caching reduces the time by approximately a factor of 2

# Timing Studies 2: Overhead of Framework of Algorithms

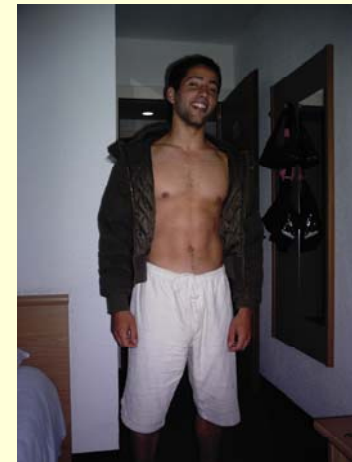
- The algorithms take a certain amount of time to reconstruct physical objects
- These are run in a steering framework which schedules them so find this scheduling time
- Determine this time by replacing real algorithms with dummy algorithms which do nothing

# Results

- Overhead of Framework:
- LVL2: ~10%
- EF: ~ 4%



# Fun Stuffs



# Thanks

- Tomasz Bold, Till Eifert
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- Jeremy Herr
- All the other summer students