



Emulator software code review

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L1 Calo Stage1 Upgrade Meeting
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Status of the code implementation

[GitHub:cms-l1t-offline/cmssw/](https://github.com/cms-l1t-offline/cmssw/)

	Data format	Algorithm	Det resp calib	Isolation	Pileup subtract
Jets	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	N/A	<input type="checkbox"/>
SumET	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	N/A	<input type="checkbox"/>
Egamma	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	N/A	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Tau	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	N/A	<input type="checkbox"/>	<input type="checkbox"/>

* Pileup subtraction for pp yet to be finalized

Packer/unpacker ???



Data format: **DataFormats/L1Trigger/interface/L1Candidate.h**

```
class L1Candidate : public reco::LeafCandidate {
```

```
public:  
    L1Candidate();
```

// construct from *both* physical and integer values

```
L1Candidate( const LorentzVector& p4,  
             int pt=0, int eta=0, int phi=0,  
             int qual=0, int iso=0);
```

```
L1Candidate( const PolarLorentzVector& p4,  
             int pt=0, int eta=0, int phi=0,  
             int qual=0, int iso=0);
```

```
~L1Candidate();
```

// methods to set integer values
// in general, these should not be needed

```
void setHwPt(int pt);  
void setHwEta(int eta);  
void setHwPhi(int phi);  
void setHwQual(int qual);  
void setHwIso(int iso);
```

// methods to retrieve integer values

```
int hwPt() const;  
int hwEta() const;  
int hwPhi() const;  
int hwQual() const;  
int hwIso() const;
```

```
private:
```

// integer "hardware" values

```
int hwPt_;  
int hwEta_;  
int hwPhi_;  
int hwQual_;  
int hwIso_;
```

```
};
```

Inherited by:

EGamma.h

Tau.h

Jet.h

EtSum.h

Question: How to set precision in emulator to match the firmware bit information ?



Algorithm

[GitHub:cms-l1t-offline/cmssw/L1Trigger/L1TCalorimeter](https://github.com/cms-l1t-offline/cmssw/L1Trigger/L1TCalorimeter)

	Algorithm	Class name
Jets	4 x 4 regions	Stage1Layer2JetAlgorithm
SumET	Summing all regions within specified η , ϕ	Stage1Layer2EtSumAlgorithm
Egamma	2 x1 clusters	Stage1Layer2EGammaAlgorithm
Tau	4 x 2 regions	Stage1Layer2TauAlgorithm

Caveat: success metric = “code exists and compiles”

Loose ends to be tightened during the run/validation step

Core missing pieces

- Need to port PU subtraction code from UCT2015
[UCT2015/plugins/RegionCorrection.cc](#)
(involves some non-trivial DataFormat conversions)

- Need to decide if/when/how to implement η -dependent correction for L1 jets to flatten their response

In addition

- Need to agree on a common input format for the FPGA and emulator, so that we can attempt to compare the outputs
- **Possible solution:** Dump the output of RAW data (for a finite number of events) into a text file to be used as input for FPGA. The emulator will use the same RAW events.