

# Cost breakdown – FEE

## ■ FEE PCB/Flex

- Currently hard to precisely estimate without design, roughly calculate by unit price per area, technology contributes mainly
  - Flex (e.g. in OTK): 6krmb/m<sup>2</sup> (40cm\*140cm+10cm\*140cm)
  - PCB (e.g. in CAL): 1Krmb/m<sup>2</sup> (6 layers, thin)
- NRE fee currently not considered

## ■ FEE PCB components

- Typically only passive capacitors (few res) will be used for decoupling
- All calc as cap
  - 0.1 rmb/unit (Murata, high reliability, large volume)
- Detector HV cap price varies strongly with det requirements, we suggested to let this part be considered in detector part

## ■ FEE connector

- Currently either use connector for easy assembly, or soldering for high reliability, yet not decided
- Roughly considered by connector (while by soldering, soldering fee is equivalent)

## ■ FEE On-det cabling

- E.g. ECAL, HCAL & Muon needs on detector local cable for signal transmission
  - Energy loss/signal loss mainly considered
- 100m global cabling not in this part

## ■ FEE module test

- Test equipment, hardware development + test fee per time

## ■ FEE soldering fee

- Two typically way of pricing: by soldering points (0.1rmb/pin w/o NRE) vs by soldering time
- hard to precisely estimate without design, calculated by 50rmb/PCB roughly

## ■ Common blocks (data link, optical & power) not in this part

- Calculated globally in the common electronics

# Cost breakdown – sub-det FEE

	ASIC (total fee)	FEE PCB/Flex		FEE component	FEE connector	FEE cabling	FEE soldering	FEE module test	Total fee
		Total area (m <sup>2</sup> )	Total fee (1krmb)						
VTX	-								
ITK	-	40	240 (Flex)						
OTK	9.15M	130	780 (Flex)						
TPC	9.613M								
ECAL	41.54M	350	350 (PCB)						
HCAL (5.62M ch)		5141+3251= 8392	8392 (PCB)	5cap/ch=0.5rmb 2.81M	50rmb/PCB~500ch 0.562M	30rmb~500ch 0.337M	50rmb/PCB~500ch 0.562M	2M	14.663M
Muon (43.2k ch)	1.9M	36.5 + 11.3	286.8 (Flex)	20 cap/ch=2.0rmb 0.1M	100rmb/PCB *1.8k PCB 0.2M	60rmb /PCB *1.8k PCB 0.1M	60rmb/PCB *1.8k PCB 0.1M	0.5M	3.19M