# Beam Instrumentation

- Protons (TT41) EDMS: 1491393
  - BPMs
  - BTVs
  - BCT
  - BLM
- Electrons EDMS: 1385308
  - Source instrumentation
  - Faraday-cup and BPMs provided by TRIUMF/CA
  - TT43 (BTVs)
- Outlook
- Baseline ‘cost to completion’

# BPMs for protons #1

- A total of 21 BPMs requested
  - 17 existing detectors available
  - 4 additional bodies/buttons available for assembly
  - 2 waiting for confirmation (VSC)
    - ~10kCHF/piece to produce from new
- Existing TT40 and 'critical' BPMs will be based on LHC electronics (optical fibres)
- Cost (400 kCHF):
  - Electronics: 180 kCHF (2015: 150kCHF)
  - Cables: 20 kCHF (2015)
  - PJAS (18 months): 180 kCHF (electronics design)
- Original estimate:
  - LHC electronics and fibres: 500 kCHF

# BPMs for protons #2

- Project milestones:
  - Electronics performance — Now -> Q2/15
  - Analogue front-end design : — Q2/15 -> Q3/15
  - Firmware design : — Q2/15 -> Q4/15
  - Electronics production : — Q3/15 -> Q1/16
  - Software design/production: — Q4/15 -> Q1/16
  - Installation and commissioning: — Q2/16 -> Q3/16

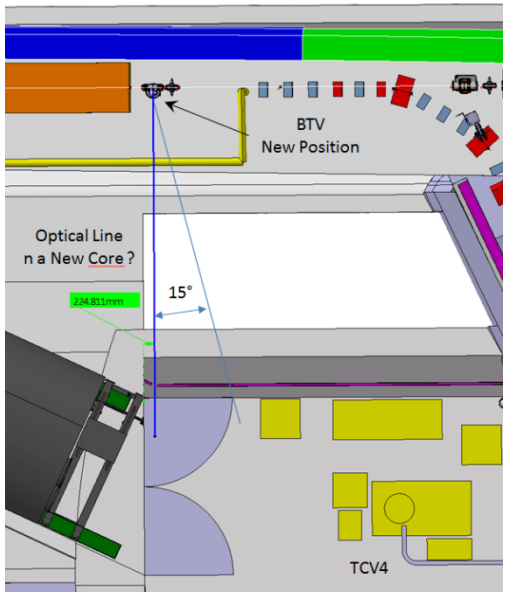
# BTVs for imaging

- A total of 9 standard BTVs to be provided (60 mm aperture)
  - 6 available (probably 1 more – **radioactive**)
  - Produce new BI spares (40 kCHF/piece)
- CNGS BTVs equipped with titanium and carbon screens
- Options:
    - Keep as are: limited resolution for pilots (titanium)
    - Replace Carbon screens with Alumina for low intensity beams + improved calibration
      - Dismantling from tunnel required
      - Cost per device ~4 kCHF (FSU) (2 weeks estimated)
- Overall cost envelope:
  - 80 kCHF -> 150 kCHF (options)

  (Original estimate: 150 kCHF)
- Additional BTV detector requested downstream of plasma-cell
  - Reuse BTV SPS detector
  - Choice of screen material to be decided (AWAKE)

# BTV for synchronisation

- Streak-camera synchronisation (p+, e-, Laser)
  - Optical line required (first proposal not ideal)
  - Make hole from TT41 to TCV4 (20cm diameter)
    - CE cost : paid by AWAKE project?
    - Optical line: 15 kCHF
    - Cables: 10 kCHF
  - New BTV detector design required
    - Design (MME) : 20kCHF
    - Production: 40 kCHF
  - Assume loan of CTF streak-camera (cost = 0)
- Overall cost: 105 kCHF



# Milestones for BTV

- Clarify specifications : Q4/14 -> Q1/15
- Decide on screen material: Q1/15 -> Q2/15
- Design streak-camera tank: Q2/15 -> Q3/15
- Produce mechanics: Q3/15
- Order cables: Q1/15
- Install detectors: Q2/16
- Hardware commission: Q2/16

# BCT for protons

- Reuse existing CNGS detector (BCTF.412337) with minor refurbishment
- Order cables to TSG4 location: Q1/15
- Install detector: Q2/16
- Hardware commissioning : Q2/16
- Overall cost: 10kCHF

# BLMs for protons

- One detector relocated (BLM.412104)
- One new detector requested (BLM.412314)
- Order or reuse cables (cost ~10kCHF)
- Mile-stones:
  - Decide on new or reused cables: Q1/15
  - Adapt electronics and software: Q1/16
  - System commissioning: Q2/16

# Electron source

- Baseline to reuse PHIN instrumentation
  - 1 emittance meter (2 BTV tanks)
    - Cost: ~40 kCHF/piece
    - Manchester/UK involvement?
  - 1 BCT
  - 1 Phase monitor
  - Cabling cost: 20 kCHF
  - BPMs from TRIUMF

# Electron beam-line

- BPMs and Faraday-cup from TRIUMF/CA
  - TRIUMF visit at CERN very helpful
    - Collaboration agreement to be signed??
- BTVs:
  - Reuse of CTF/CLEX detectors?
  - Production of new devices: ~40 kCHF/piece

# Outlook/pending questions

- Biggest system in terms of complexity = BPM
  - Lab results expected by Q2/15 (single bunch/passage)
  - Remaining doubts about p+/e- in common line (TRIUMF)
- Choice of BTV screen material expected Q1/15
  - Input to design of streak-camera tank
- Streak-camera needs ‘direct’ optical line
  - Hope for good news from ‘CE’ group (cost ..)
- Question about PHIN instrumentation after 30 years and reuse of CTF/CLEX instrumentation

# Baseline for AWAKE

- p+:
  - No replacement of carbon screens
  - 3 new BTV tanks to be produced
  - Hole to be made for synchronisation monitor
  - Total cost: 645 kCHF + CE
- e-:
  - Reuse of PHIN at source
  - Reuse of CTF/CLEX BTVs for transfer-line
  - TRIUMF: BPMs and Faraday-cup
  - Cabling cost for BI: ~40 kCHF