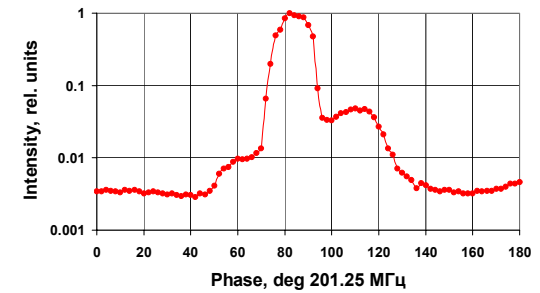
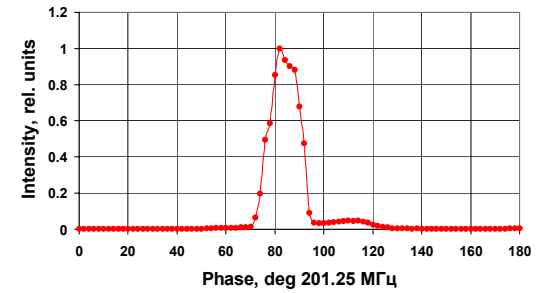
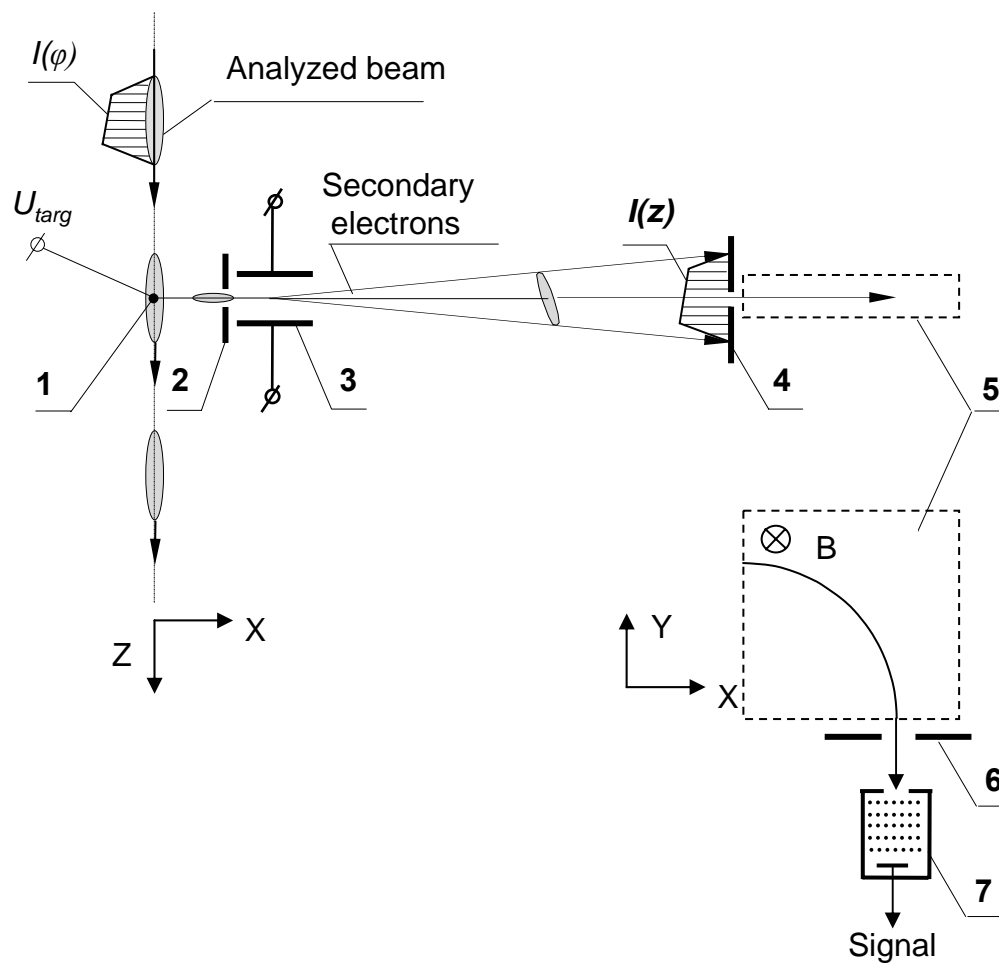


# **THE FIRST RESULTS OF BUNCH SHAPE MEASUREMENTS IN THE SNS LINAC**

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**Bunch shape measurement of 10 MeV  $H^-$  beam without electron energy separation (DESY Linac-3)**

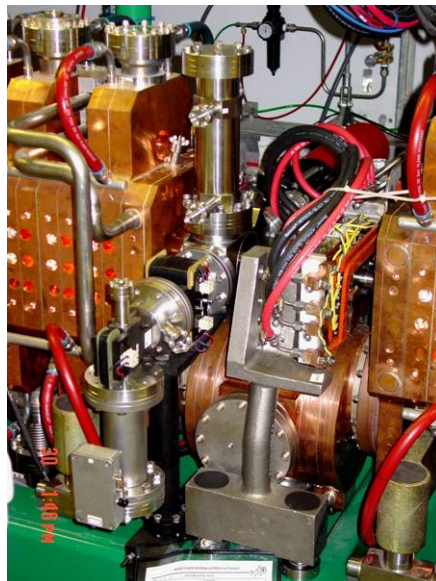
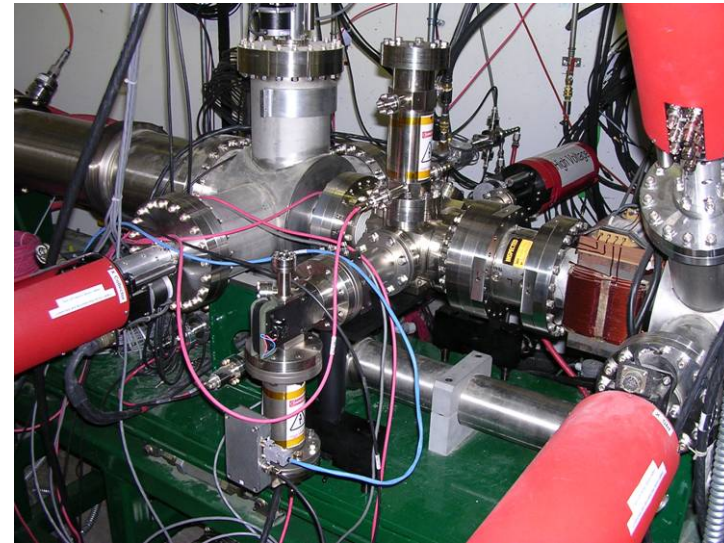
### Configuration of Bunch Shape Monitor

1 - target, 2 - input collimator, 3 - rf deflector combined with electrostatic lens, 4 - output collimator, 5 – bending magnet, 6 – collimator, 7 – Secondary Electron Multiplier

**General view of BSM before installation in D-plate**

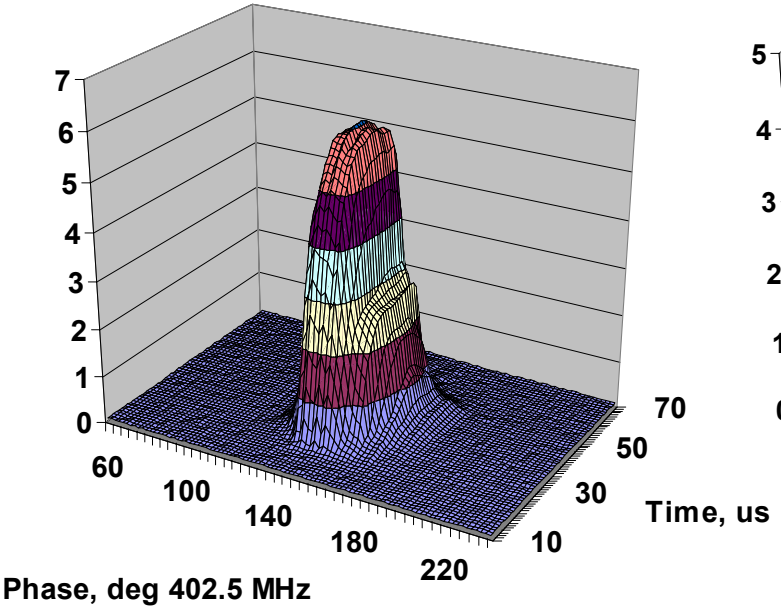


**BSM installed in D-plate  
(August 2003)**

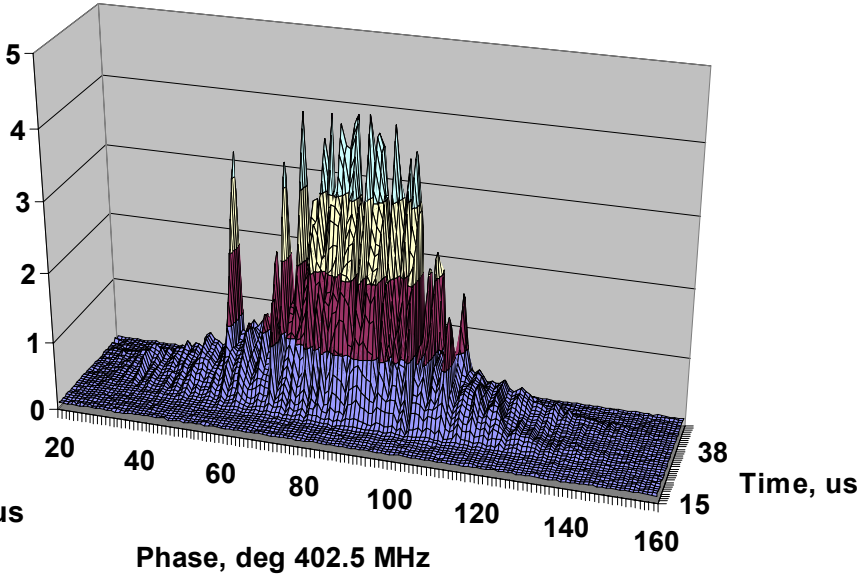


**BSM installed in intersegment of  
CCL Module #1 (July 2004)**

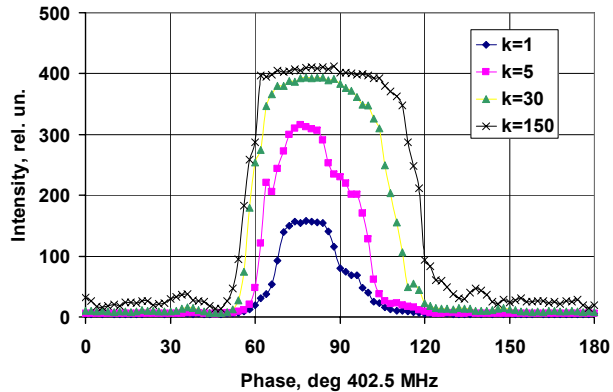
Typical evolution of bunch shape along the beam pulse.



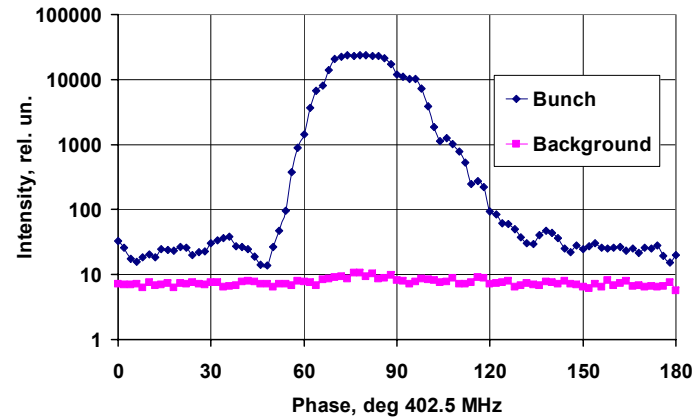
Manifestation of Low Level RF instabilities in Bunch Shape



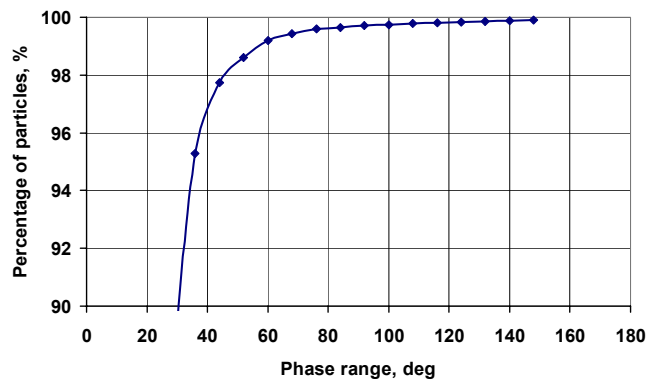
# Longitudinal Halo Measurements



**Result of Bunch Shape Measurement for different electron multiplier gains.**



**Presentation of bunch shape in a wide intensity range.**

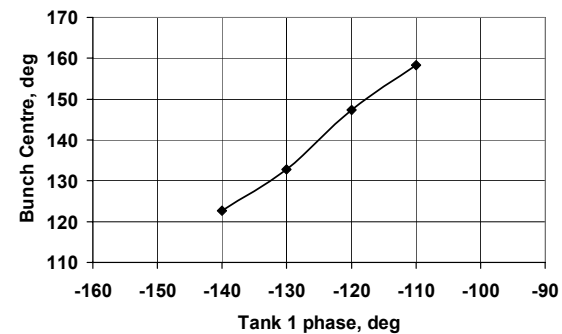
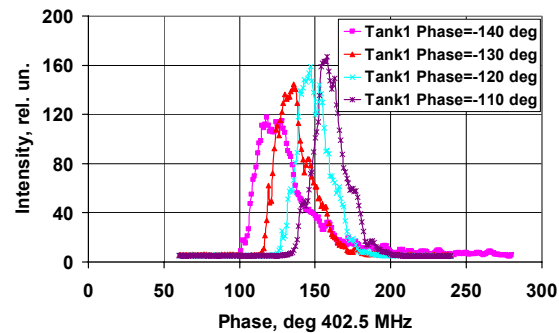


**Particle portion as function of phase range.**

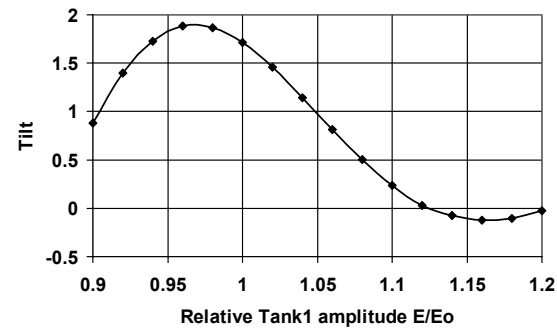
# Longitudinal Emittance Measurements

## Calibration of Accelerating Field Amplitude

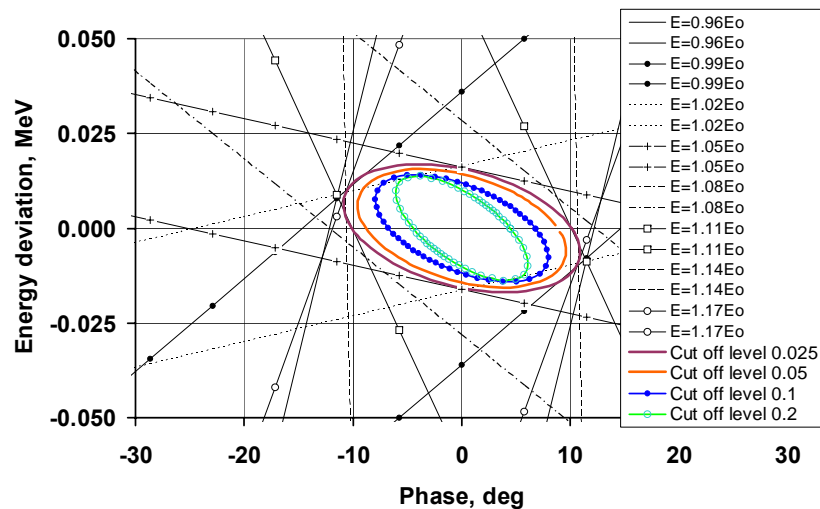
(by comparing experimental and theoretical changes of bunch phase positions vs accelerating field phase shift)



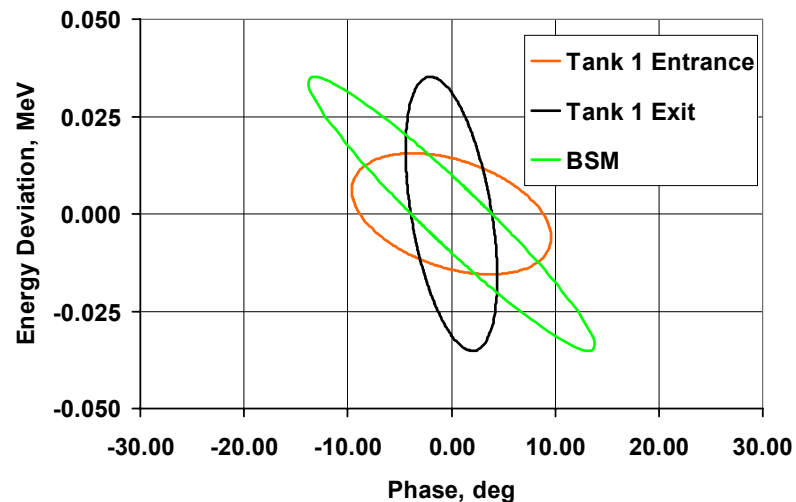
**Bunch phase position  $\Phi$  for different Tank 1 phases.**



**Theoretical dependence of  $d\Phi/d\phi$  on field amplitude.**



**Phase ellipses at the entrance of Tank 1 for different cut off levels (The tangents are shown for 0.025 cut off level).**



**Phase ellipses at the entrance of Tank1, the exit of Tank 1 and at the BSM position for cut off level 0.05**

**Longitudinal emittance value (the design parameter 0.131 MeV·deg)**

| Cut off level      | 0.025 | 0.05  | 0.1   | 0.2   |
|--------------------|-------|-------|-------|-------|
| Emittance, MeV·deg | 0.171 | 0.138 | 0.095 | 0.062 |