

Conceptual design for a new beam charge readout electronics

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Outline

Conceptual
design for a
new beam
charge
readout
electronics

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Bunch Charge
Measurements

Dark Current

Design Studies

Results of
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- Bunch Charge Measurements
- Dark Current

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PITZ - Photo Injector Test Facility in Zeuthen

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Developing the source of high quality electron beams for the
European XFEL

Beam Diagnostics - Bunch Charge Measurements

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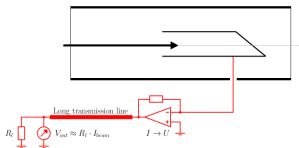
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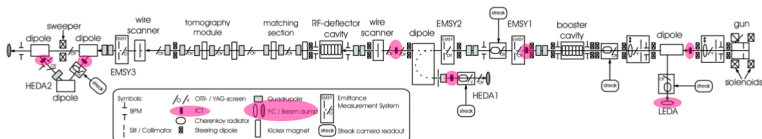
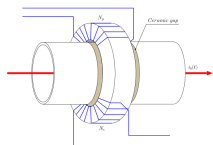
Intercepting

Directly interacting with the beam -
Faraday Cups



Non-intercepting

insignificant impact on the beam -
Integrating Current Transformers



Dark Current

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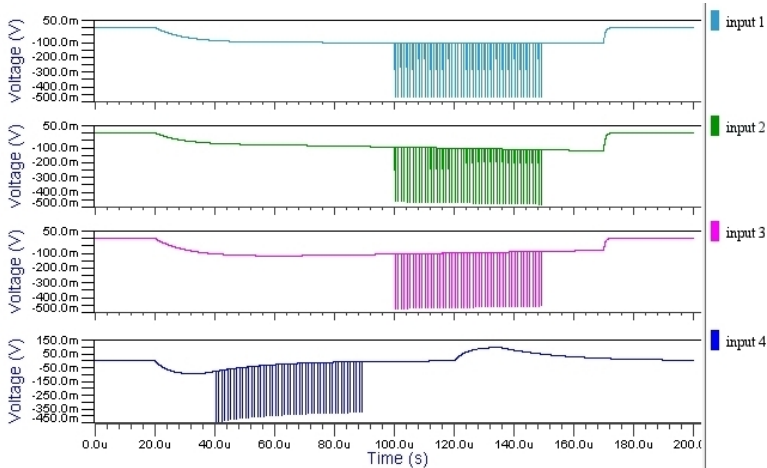
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First design with two integrators

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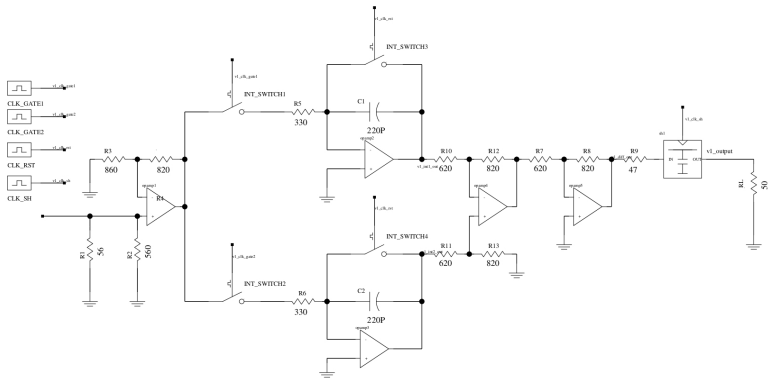
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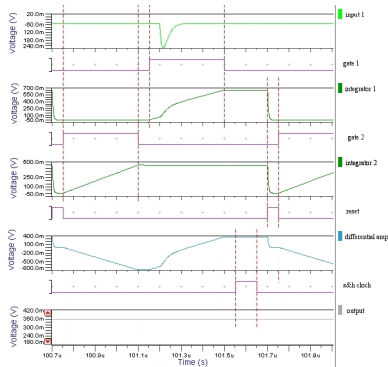
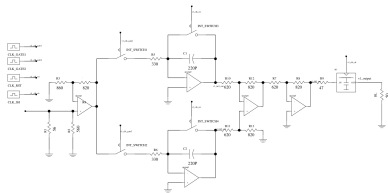
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Second design with one integrator, subtracting previously remembered value

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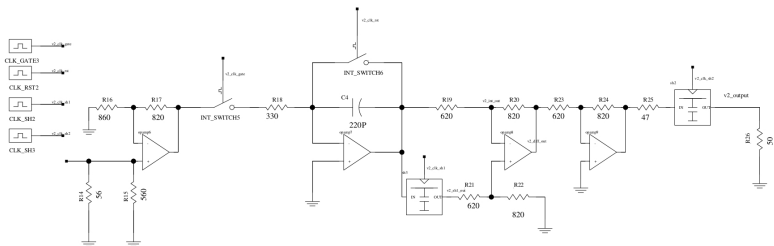
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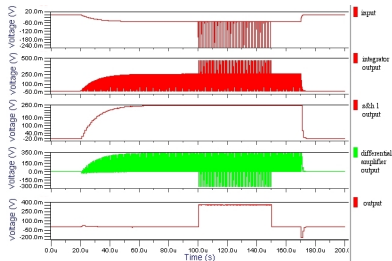
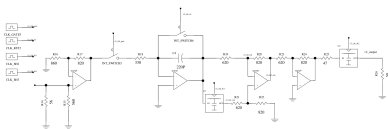
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Third design with subtracting the offset before integrating

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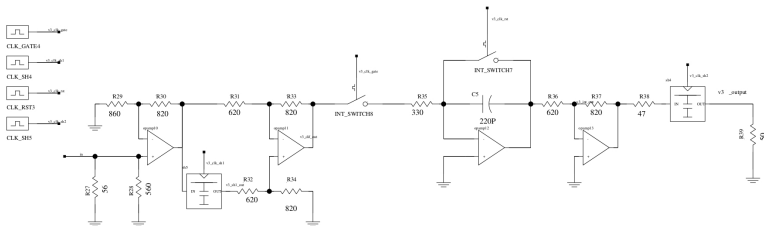
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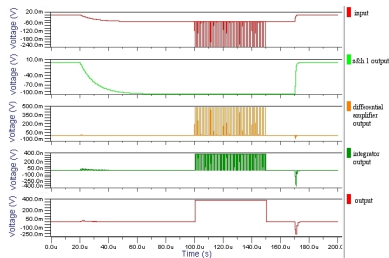
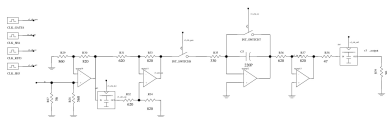
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Results of simulation

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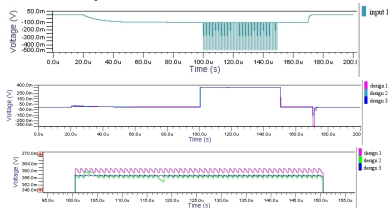
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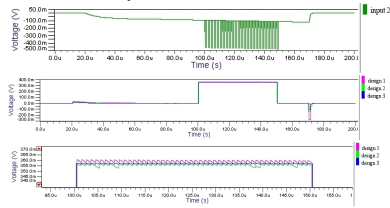
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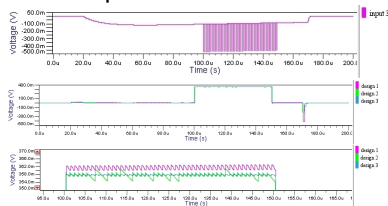
First input



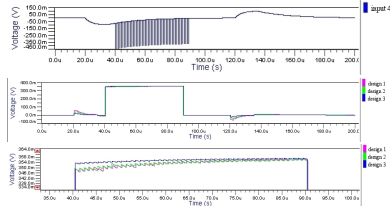
Second input



Third input



Fourth input



Results of simulation - fourth input

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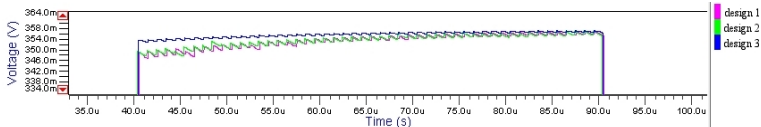
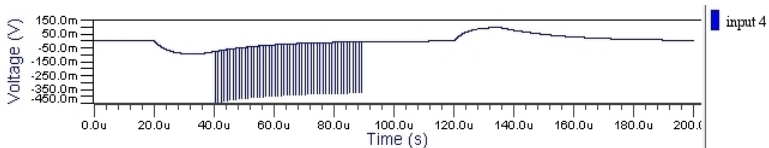
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- Three possible designs proposed
- Circuits' behaviour tested by checking the responses for signals with different shape of dark current:
 - Similar responses for every design
 - Problem with first design: exact components values needed
 - Second design uses only one integrator
 - Third one seems to give the best response for complicated dark current shape
- Real behaviour will vary due to imperfect components

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Thank you for your attention



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