

Collimator study

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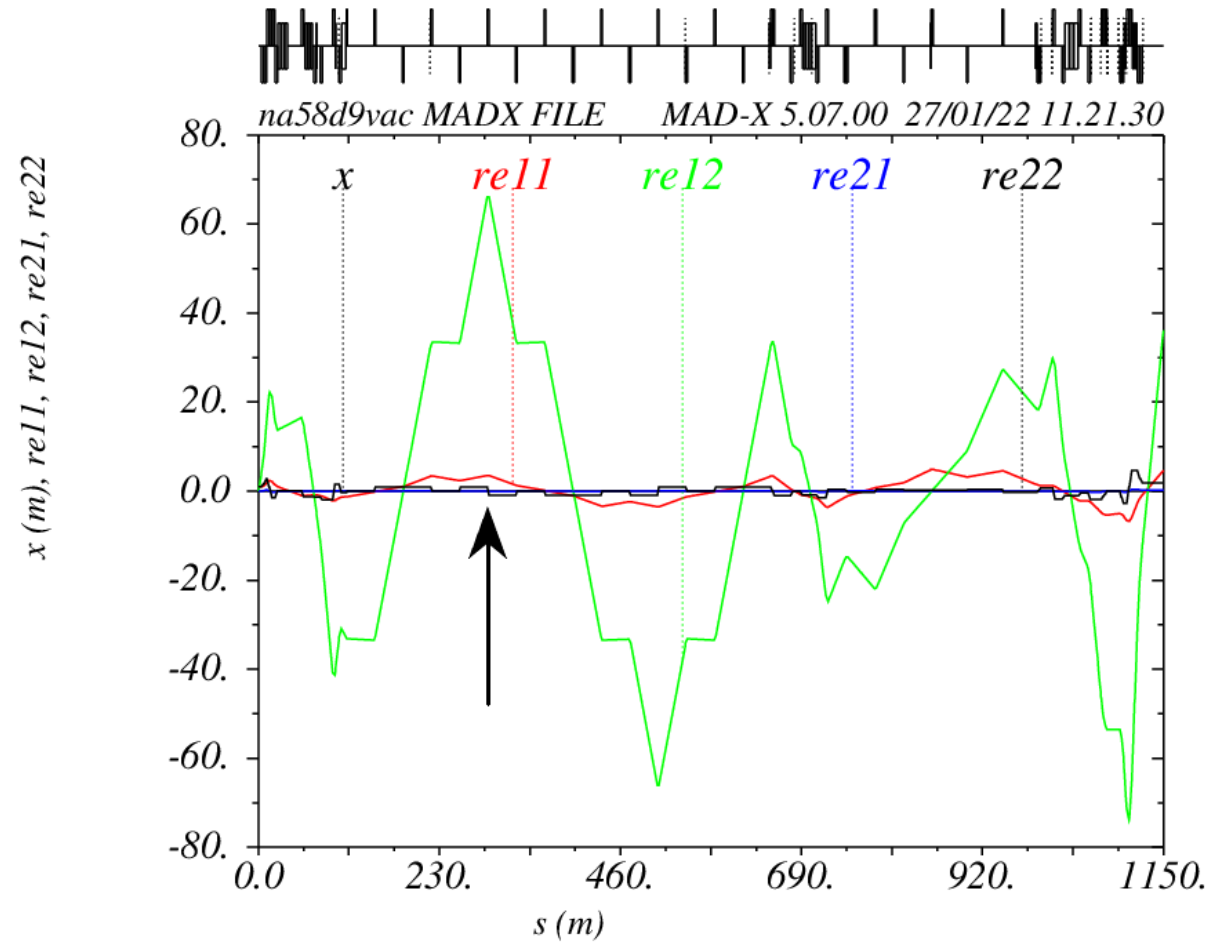
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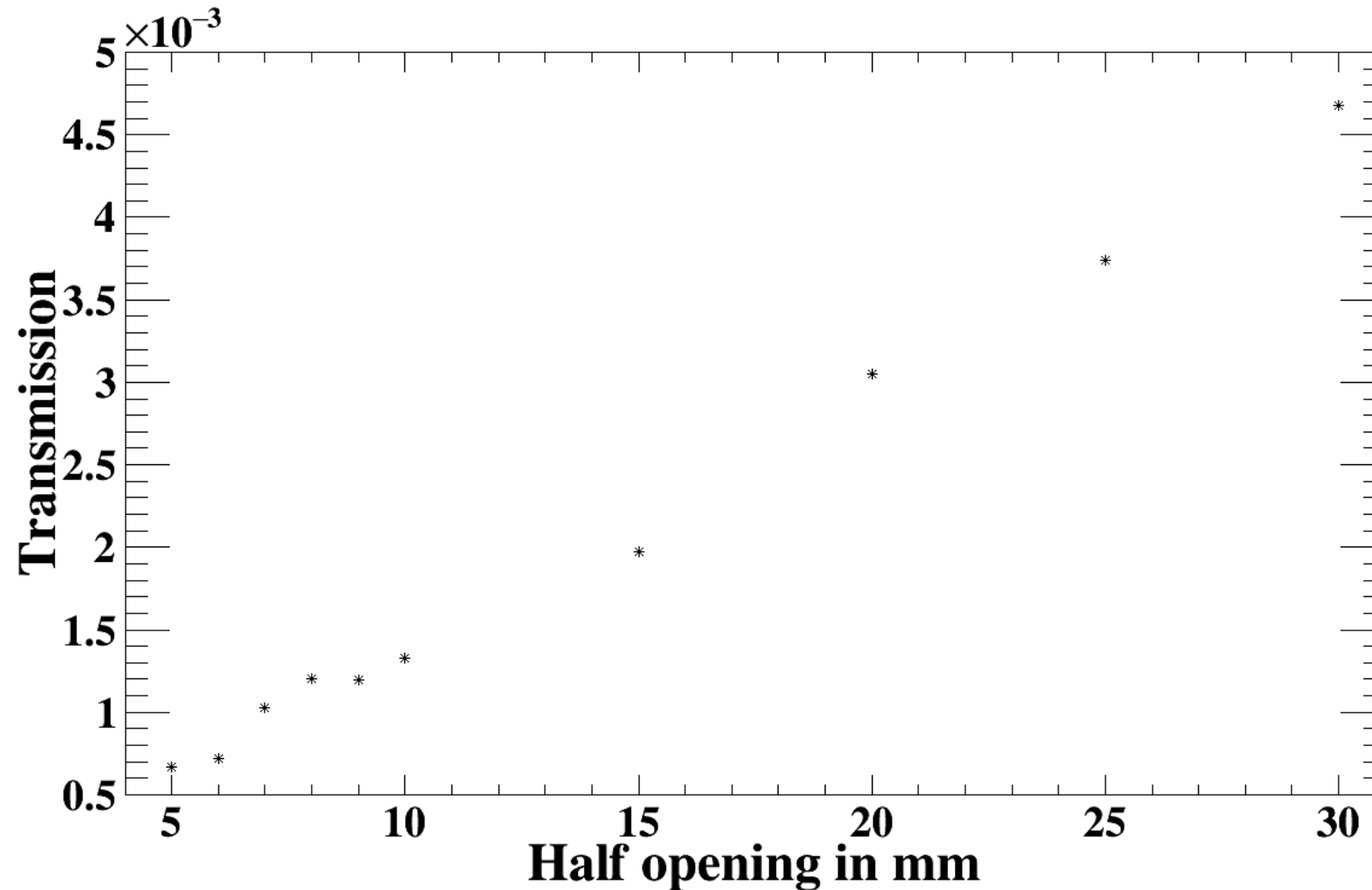
Current situation

- **In a previous meeting we showed already the advantage when having vacuum along M2 instead of long air sections**
- **For AMBER Drell-Yan we need highest possible kaon intensity meaning:**
 - Lose as little kaons as possible
 - Increase the tagging efficiency of the CEDARs by improving the beam parallelism at their location
- **Lau studied an alternative M2 optics design in 2009 with a larger beam at the CEDARs**
- **We studied the influence of further collimation on the beam divergence**
- **Shown transmissions relative to number of particles that were simulated**
 - Currently, we do these with a realistic beam composition to see how the kaon intensity would be influenced by the proposed collimation

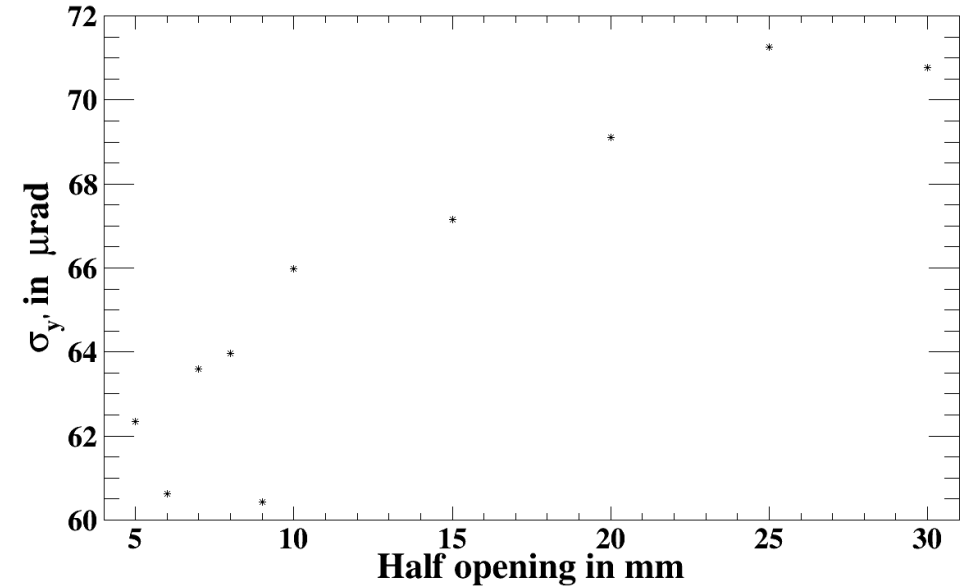
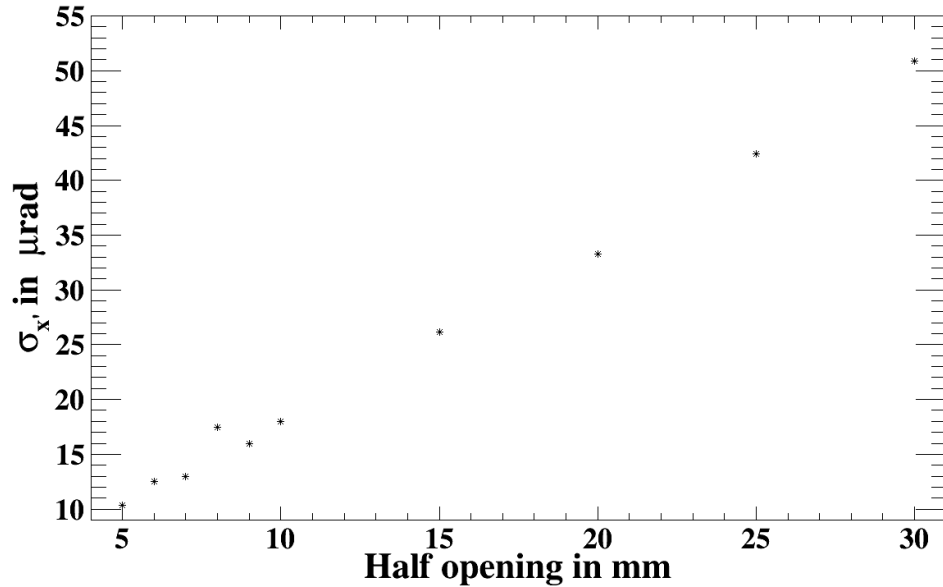
x-plane



Transmission horizontal collimator

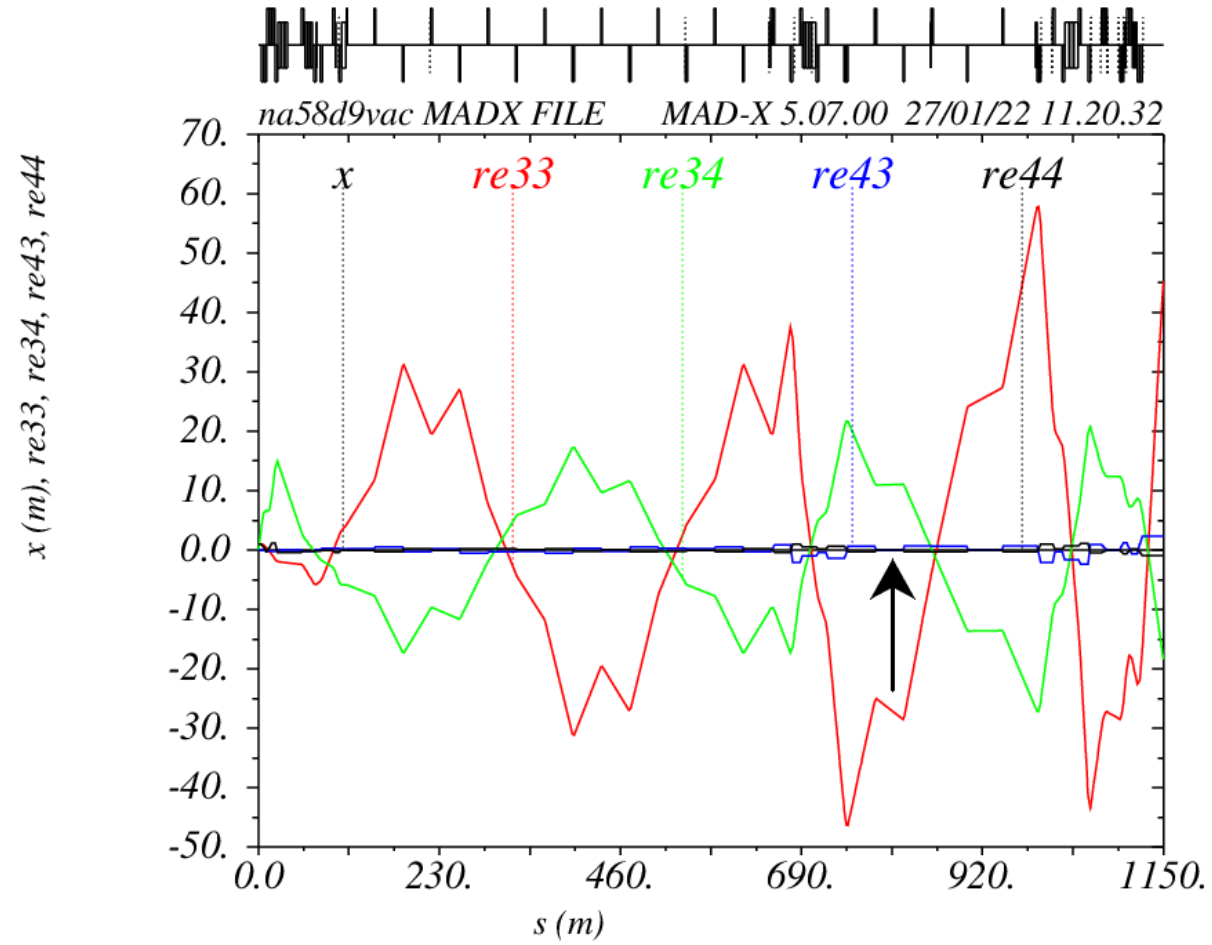


Dispersion horizontal collimator

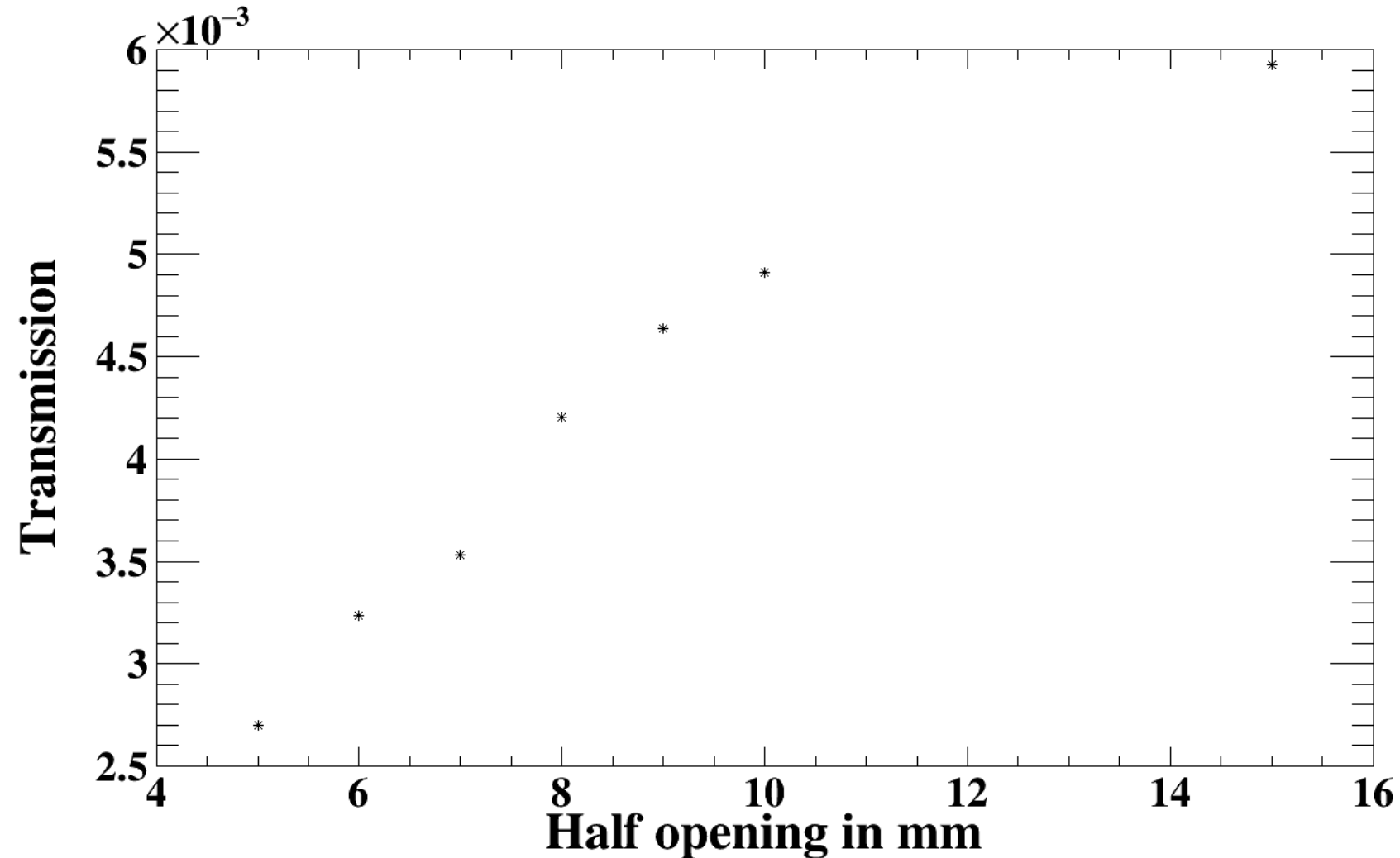


- **Clear reduction of divergence in collimated plane**
 - We would gain a factor 2 when closing the collimator from 30mm to 15mm
 - Further decrease would not make a difference as $\sqrt{\sigma_{x'}^2 + \sigma_{y'}^2}$ is the determining factor
 - We would lose a factor 2 of intensity
- **No influence as expected in the other plane**

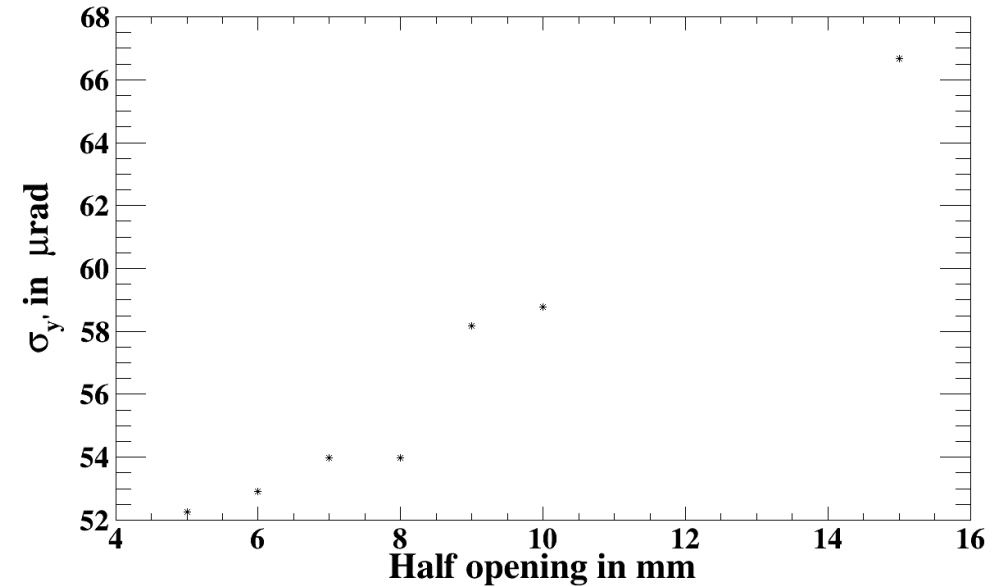
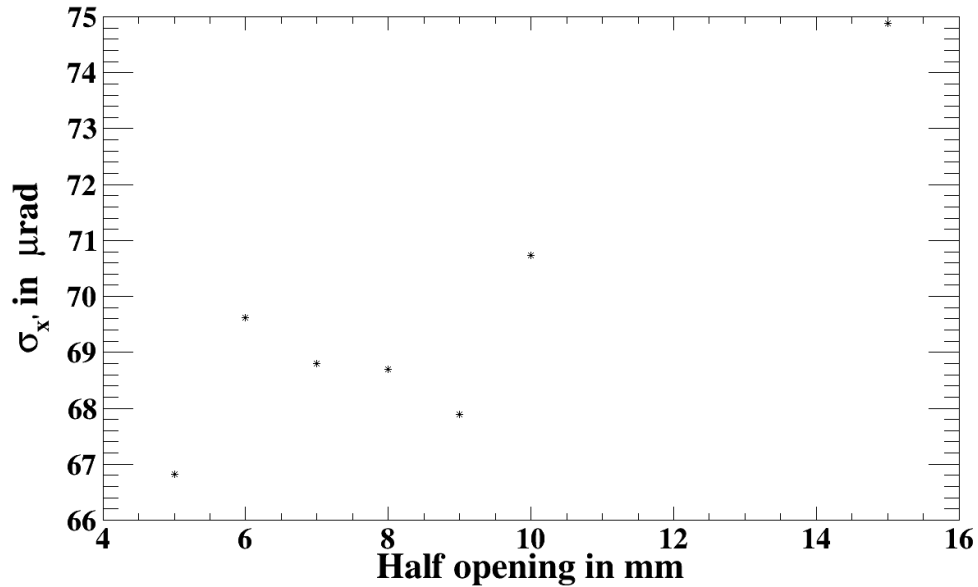
y-plane



Transmission vertical collimator



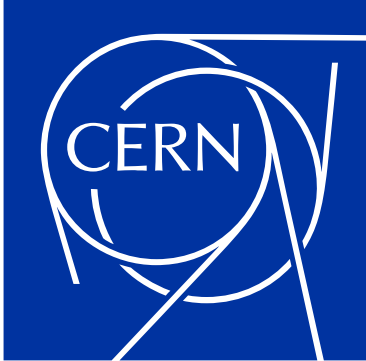
Dispersion vertical collimator



- **No real improvement when considering the loss of intensity**
 - However, when minimizing the divergence in x' the divergence in y' is the limiting factor
- **Again, no influence in the plane in that the beam is not collimated**

Conclusion

- **This is a first proposal for an optimization of the collimation scheme**
- **The positions of the collimators are not final; there might be still room for improvement**
- **Background in the experiment should not be enhanced as we collimate in the x -plane far upstream from the target; and in the y -plane even upstream of COLL5**
- **The simulations have been performed in vacuum**
 - The clear advantage of vacuum over air along M2 have been showed in a separate meeting already
- **Currently, simulations with a realistic beam composition are performed to see the influence on the kaon intensity when collimating the beam**
- **We will study if we could achieve the same performance with the existing collimators to save costs and implementation time**



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