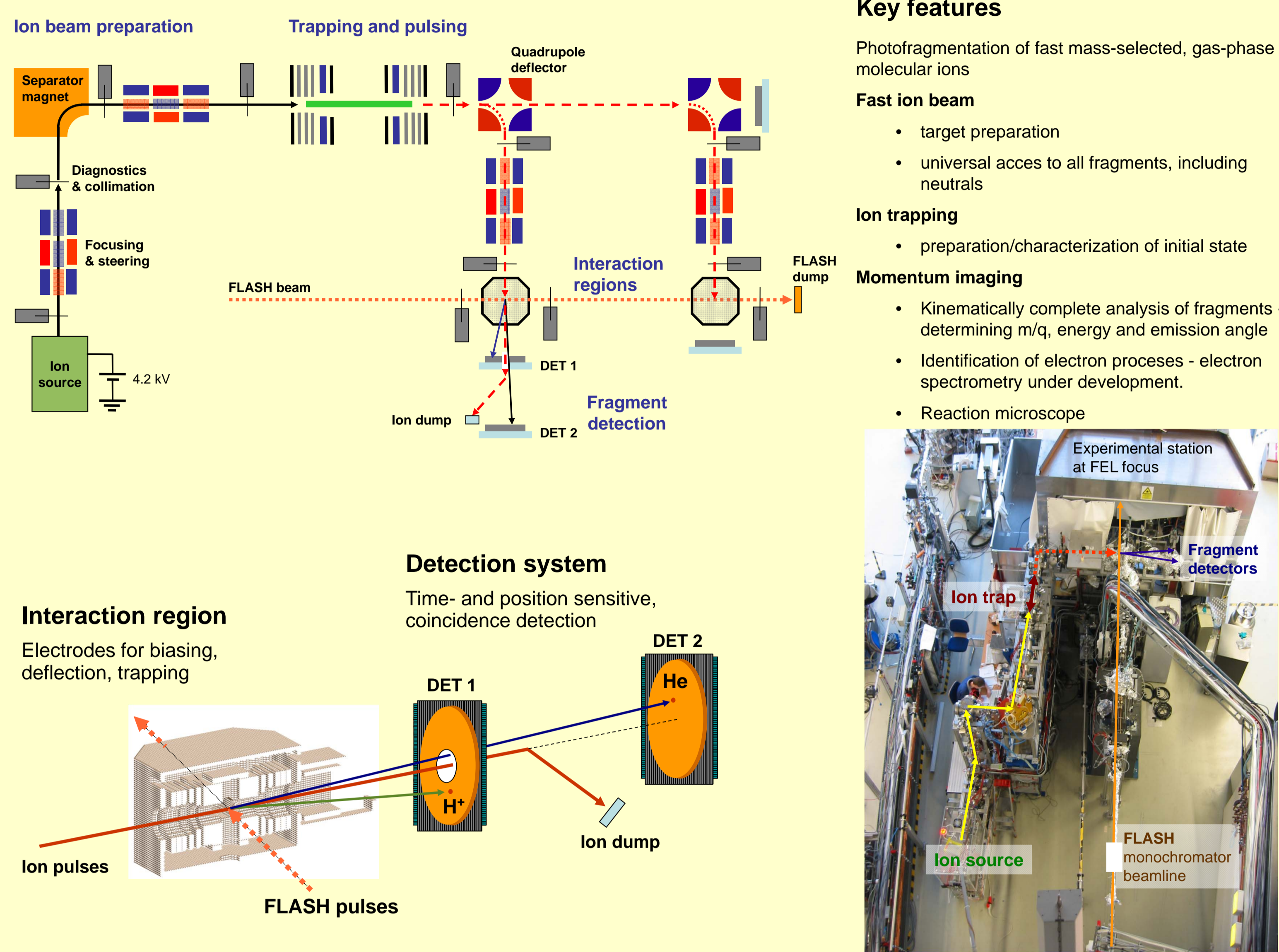
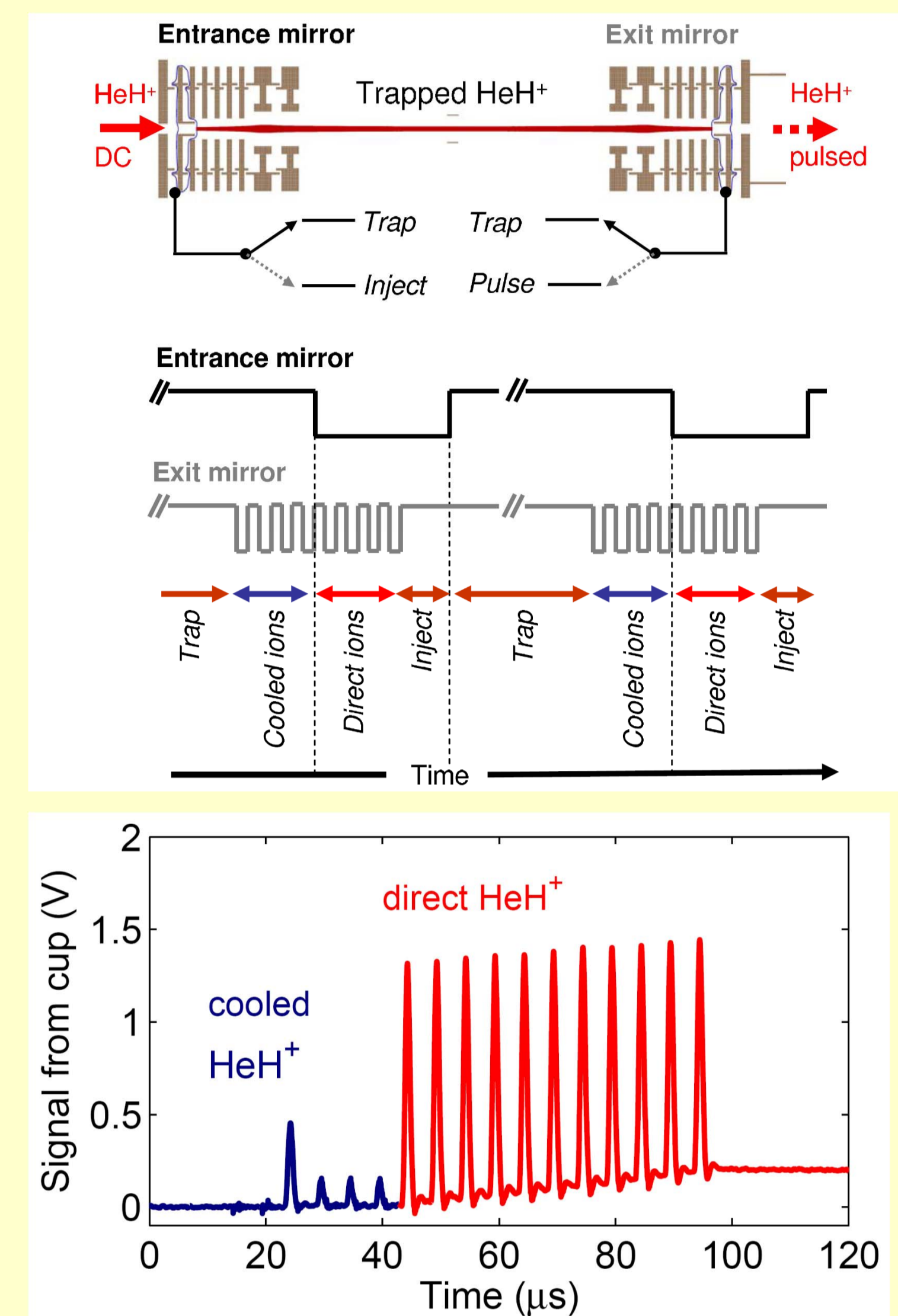


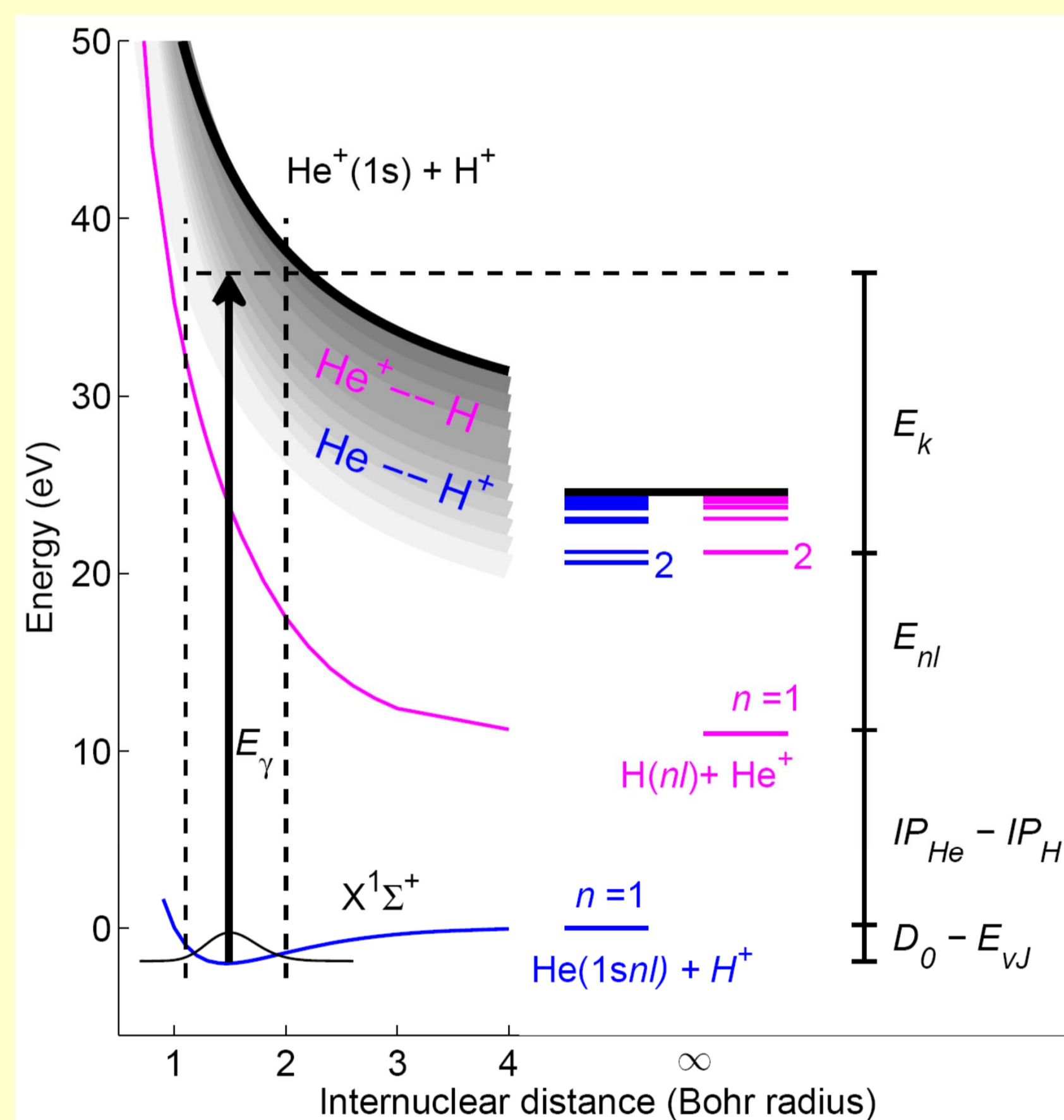
The TIFF experiment [3,4] – Trapped Ion Fragmentation at FLASH [1,2]



Vibrationally hot and cold ions [5]



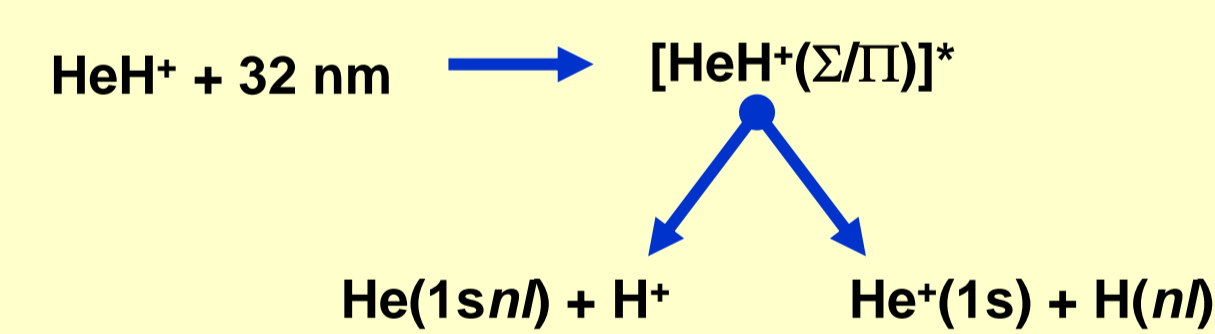
HeH⁺ XUV photodissociation



HeH⁺ is a fundamental system

- Non-adiabatic interactions
- Astrophysics
- Neutrino mass measurements
- Ionic analog of H₂ – e.g. dissociation in strong laser fields

XUV photodissociation of HeH⁺



- Dominating reaction channels? He + H⁺ or He⁺ + H
- Dominating absorption states? Σ - Σ versus Σ - Π
- Dominating fragment states? H(n), He(1 sn) – which n ?
- Importance of vibrational excitation?

Summary of results on HeH⁺ + 32 nm [5]

Reactions channels ← Imaging with biased interaction region

	HOT ions	COLD ions ($v=0$)	Theory [6]
He ⁺ + H			
He + H ⁺	0.96 ± 0.11	1.70 ± 0.48	~ 1.6

Final states - fragment excitation ← Final kinetic energy

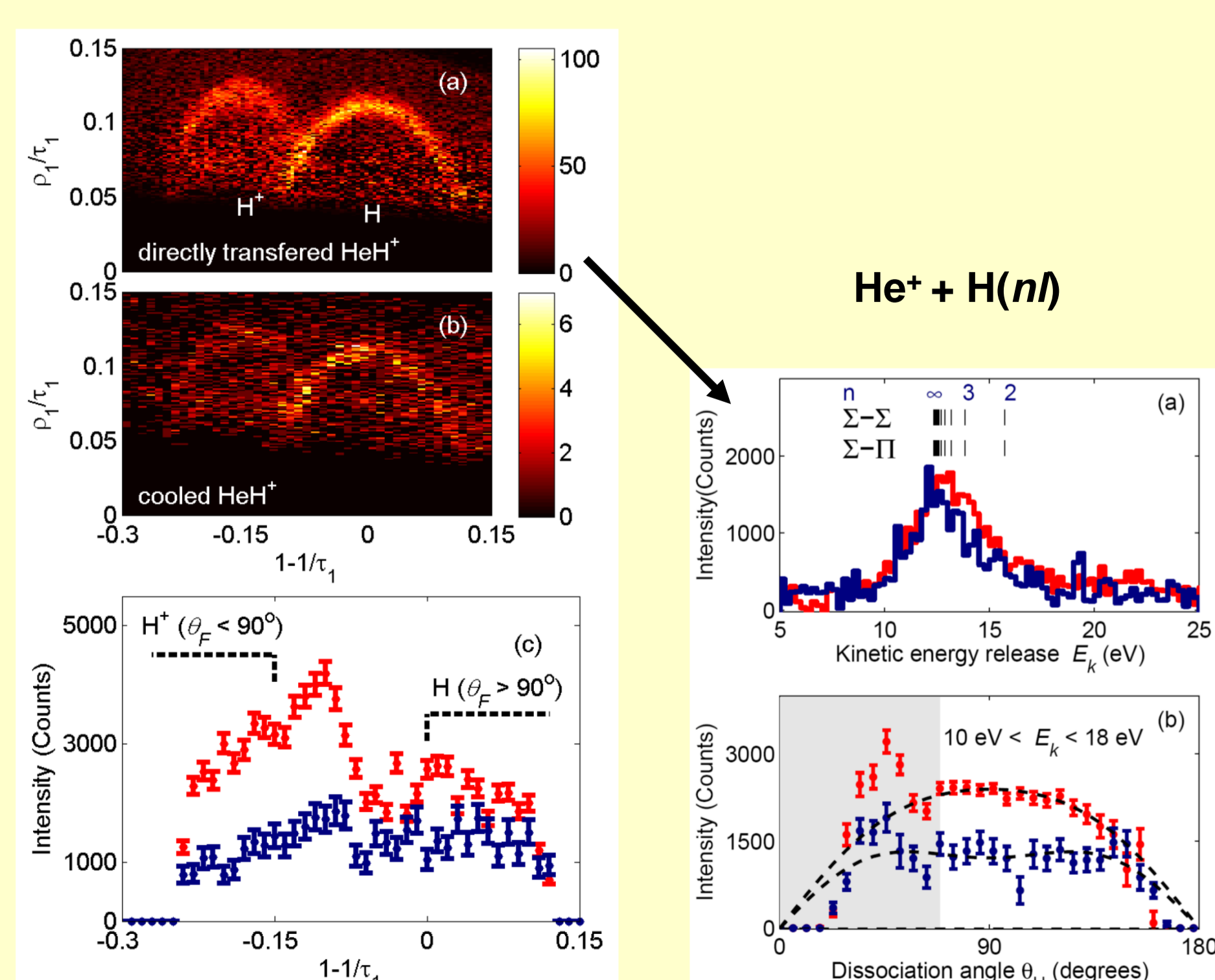
	HOT ions	COLD ions ($v=0$)	Theory
He(1 sn) + H ⁺ : $n > 3 - 4$		$n > 3 - 4$?
He ⁺ + H(n) : $n > 3 - 4$		$n > 3 - 4$?

Absorption states ← Angular distributions

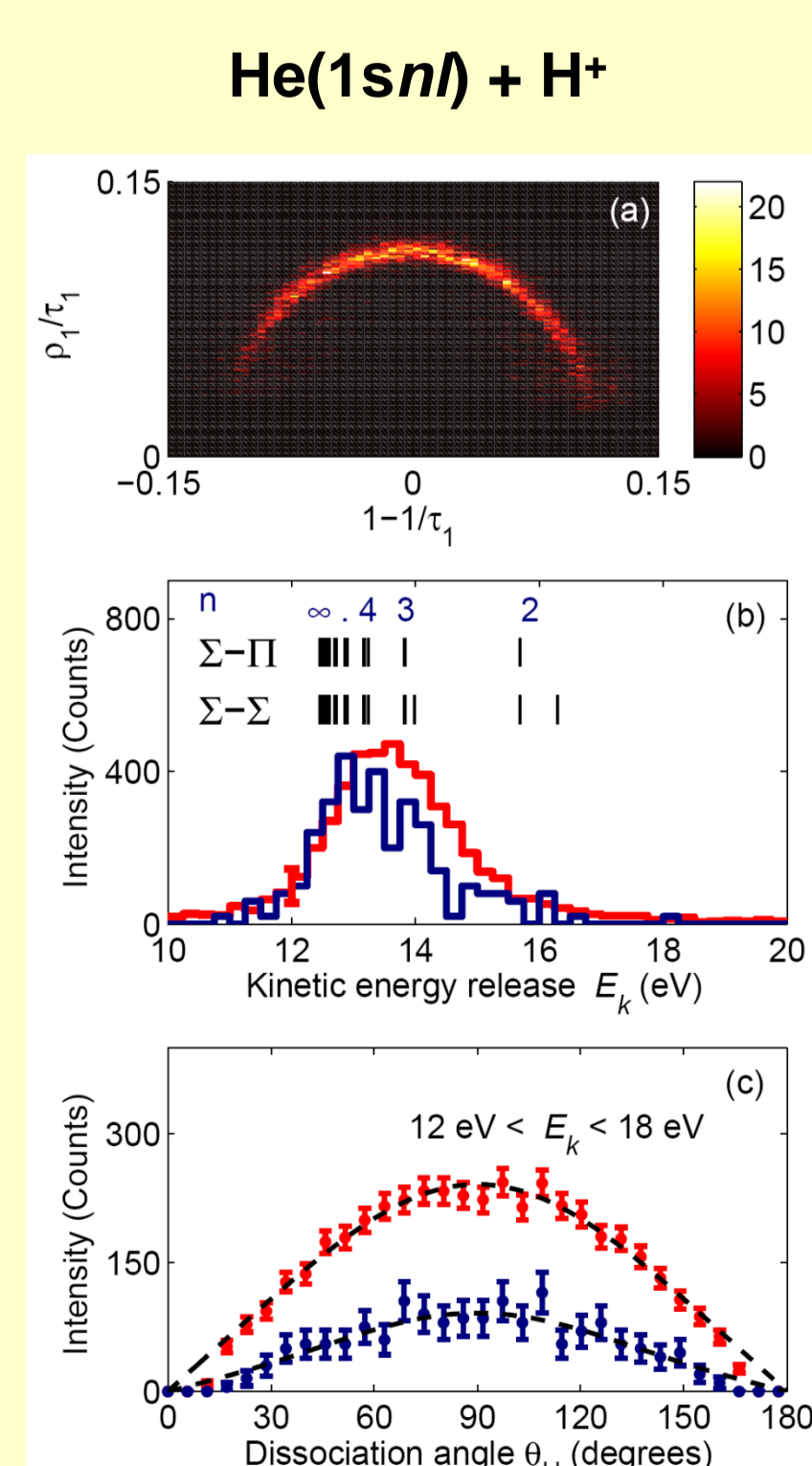
	HOT ions	COLD ions ($v=0$)	Theory [6]
He + H ⁺ :			
$\Sigma - 30 \pm 2 \%$		$\Sigma - 24 \pm 6 \%$	$\sim 30 \%$
$\Pi - 70 \pm 2 \%$		$\Pi - 76 \pm 6 \%$	$\sim 70 \%$
He ⁺ + H :			
$\Sigma - 38 \pm 3 \%$		$\Sigma - 50 \pm 3 \%$	$\sim 15 \%$
$\Pi - 62 \pm 1 \%$		$\Pi - 50 \pm 5 \%$	$\sim 85 \%$

Experimental results [5]

Imaging with a biased interaction region



Imaging with coincidence detection



References

- [1] W. Ackermann *et al.*, Nature Photonics 1, 336 (2007)
- [2] K. Tiedtke *et al.*, New J. Phys. 11, 023029 (2009)
- [3] H. B. Pedersen *et al.*, Phys. Rev. Lett. 98, 223202 (2007)
- [4] H. B. Pedersen *et al.*, Phys. Rev. A 80, 012707 (2009)
- [5] H. B. Pedersen *et al.*, Phys. Rev. A 82, 023415 (2010)
- [6] I. Dumitriu and A. Saenz, J. Phys. B 42, 165101 (2009)
- [7] K. Sodoga *et al.*, Phys. Rev. A 80, 033417 (2009)