

deepTools

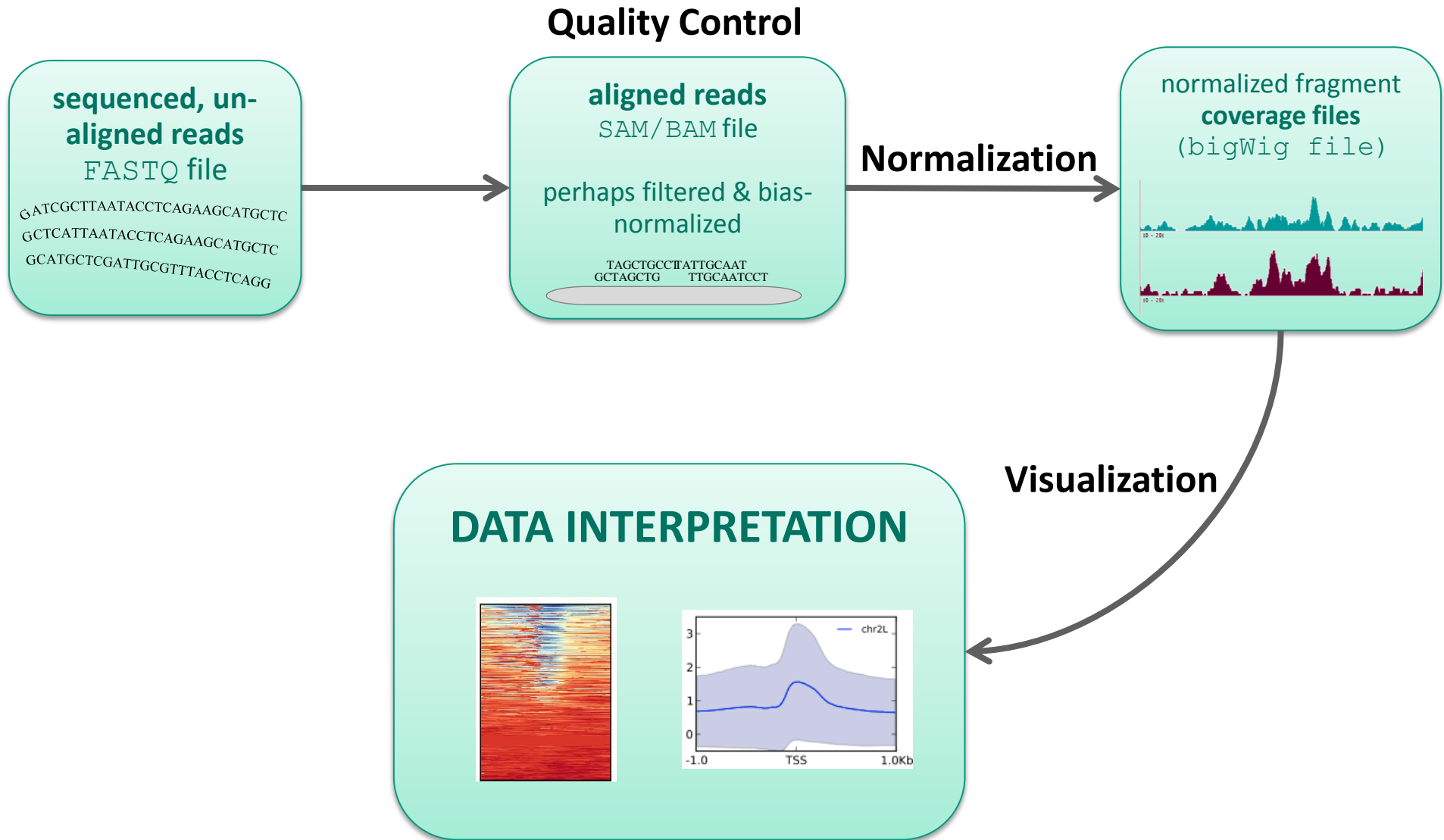
a flexible platform for exploring deep-sequencing data

Björn Grüning - Galaxy Community Conference 2014

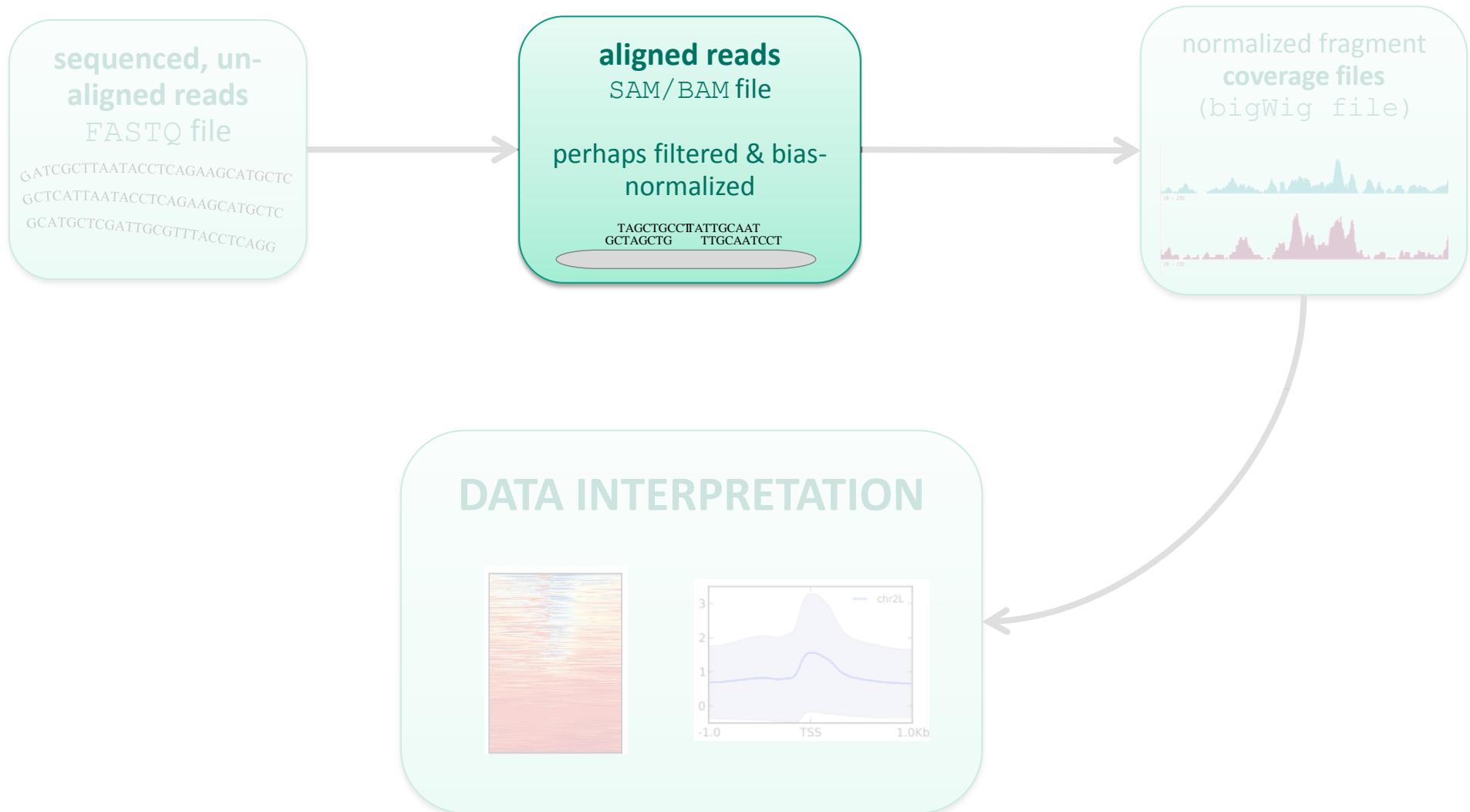
Before deepTools

- NGS analyses often characterized by
 - Specialized and custom-made scripts
 - Hidden filtering strategies
 - Lack of standardization and reproducibility
- Existing tools:
 - Require experience with command-line
 - No graphical output to guide interpretation of results
- Several biases in NGS data
- Deters biologists from taking part in analysis of their data

deepTools data processing workflow

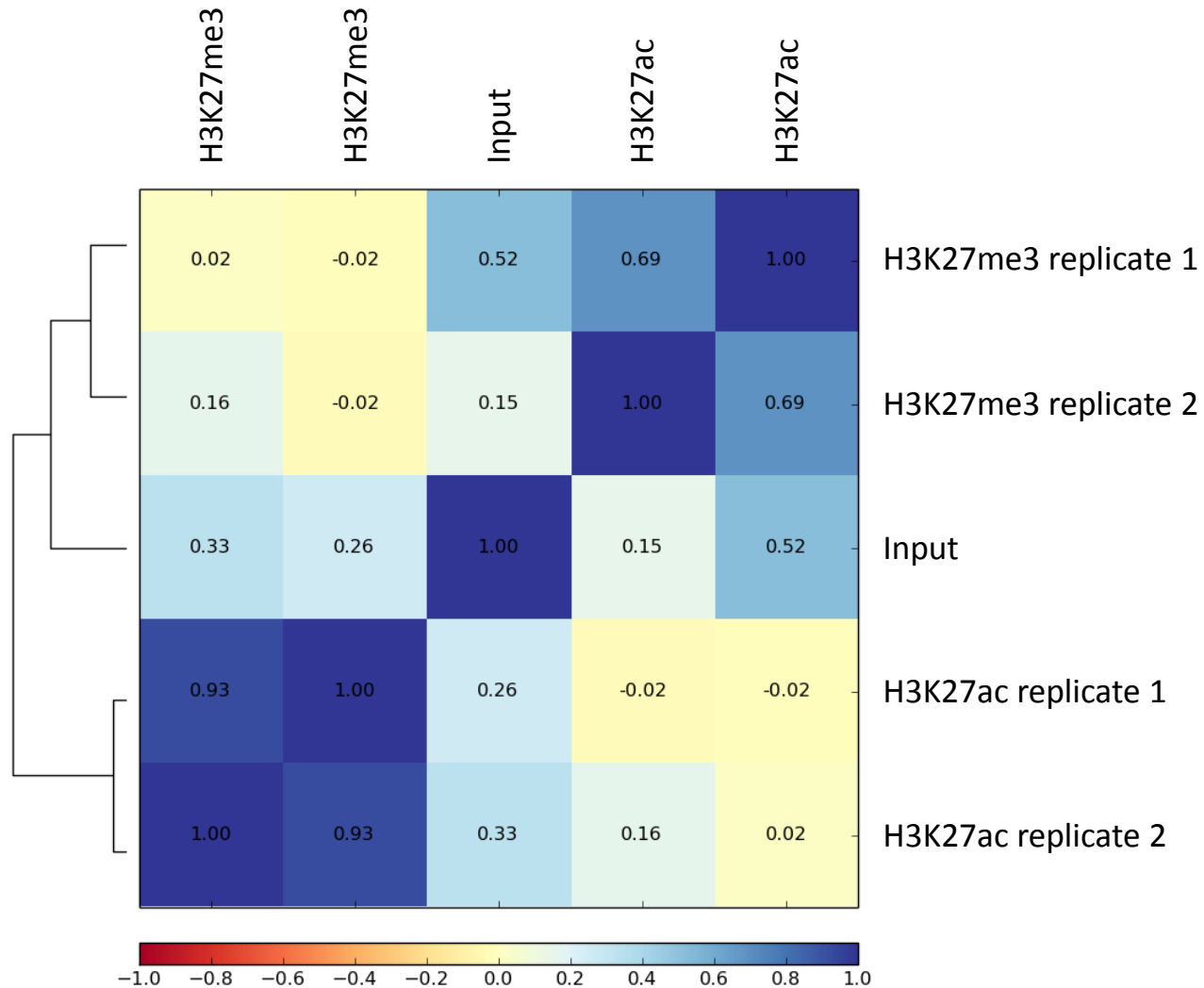


Quality Control



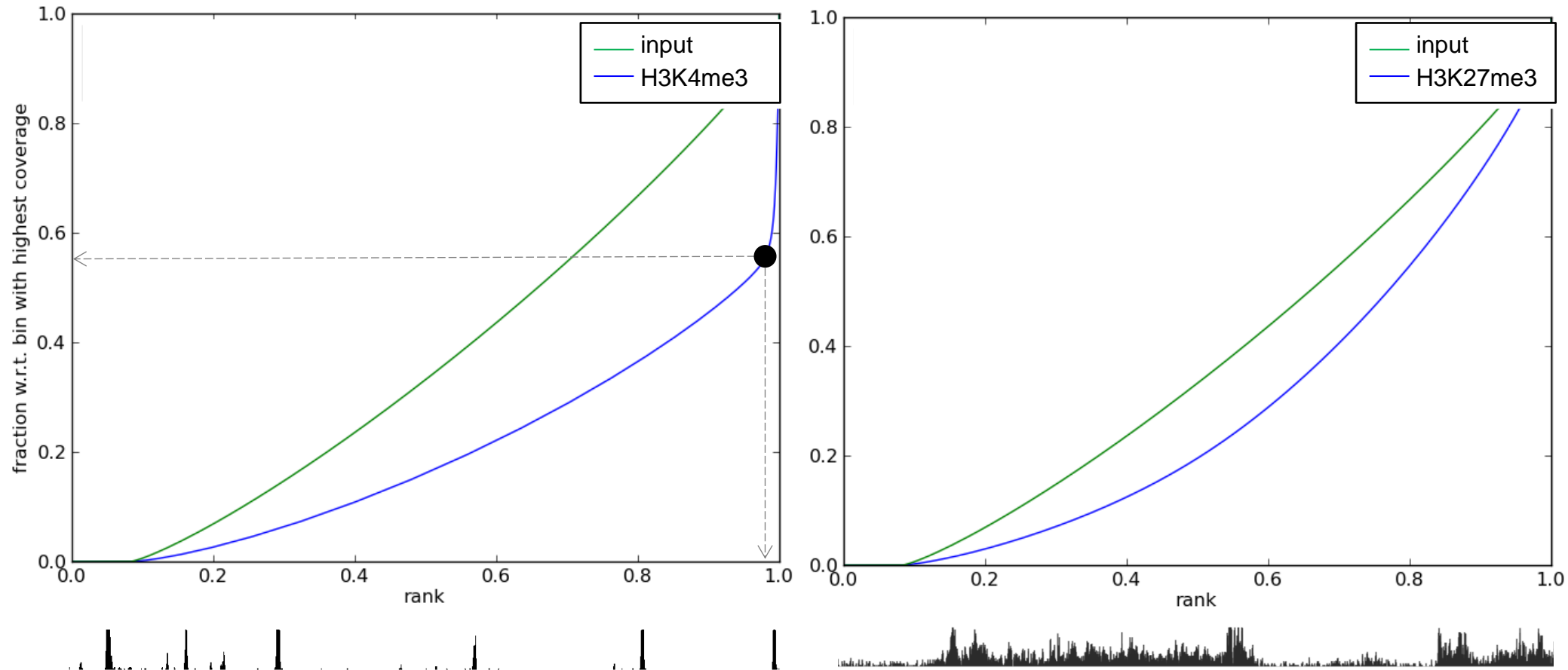
bamCorrelate

H3K27me3 = repressive chromatin
H3K27ac = active chromatin

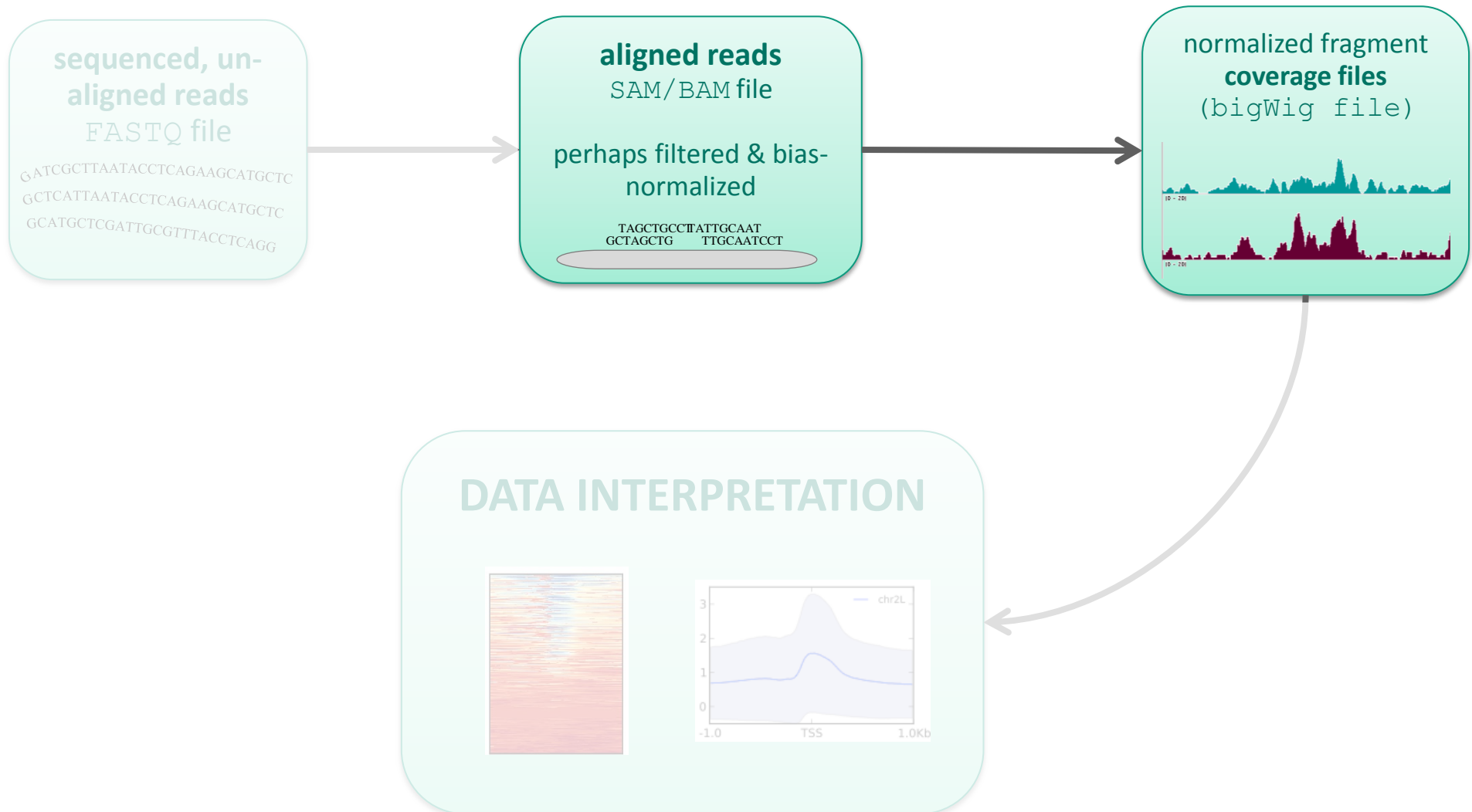


bamFingerprint

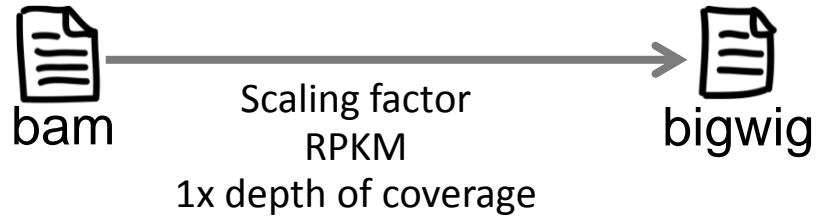
- How well can the signal in the ChIP-seq sample be differentiated from the background?



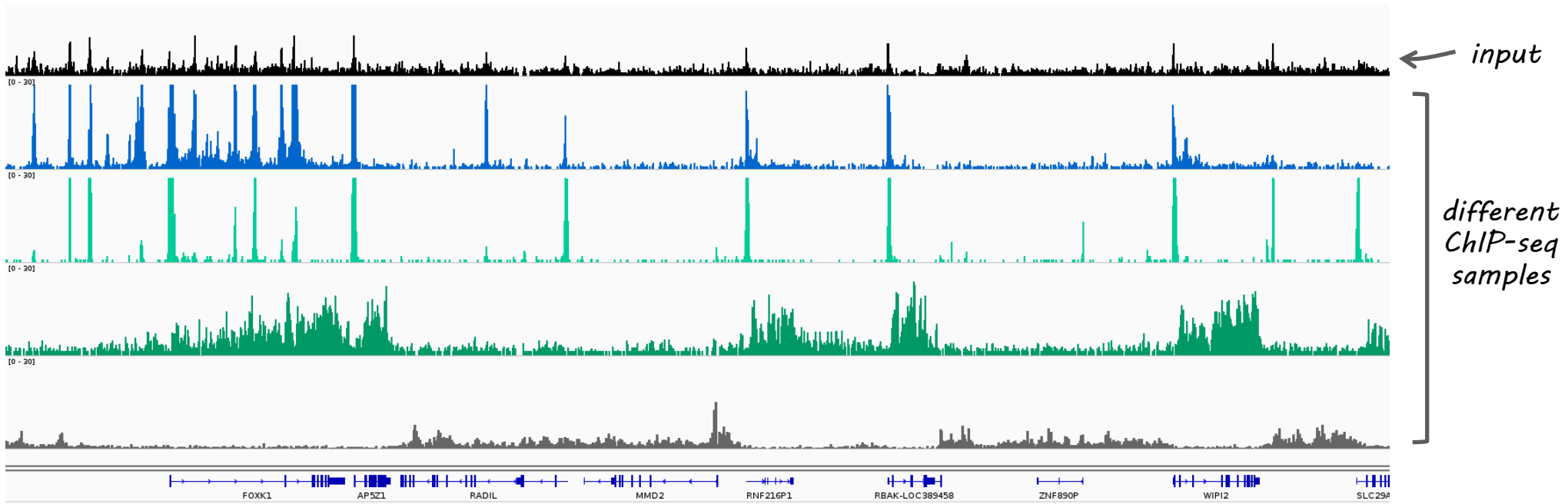
Normalization



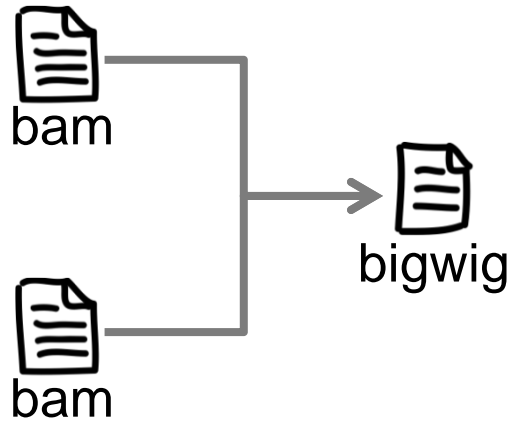
bamCoverage



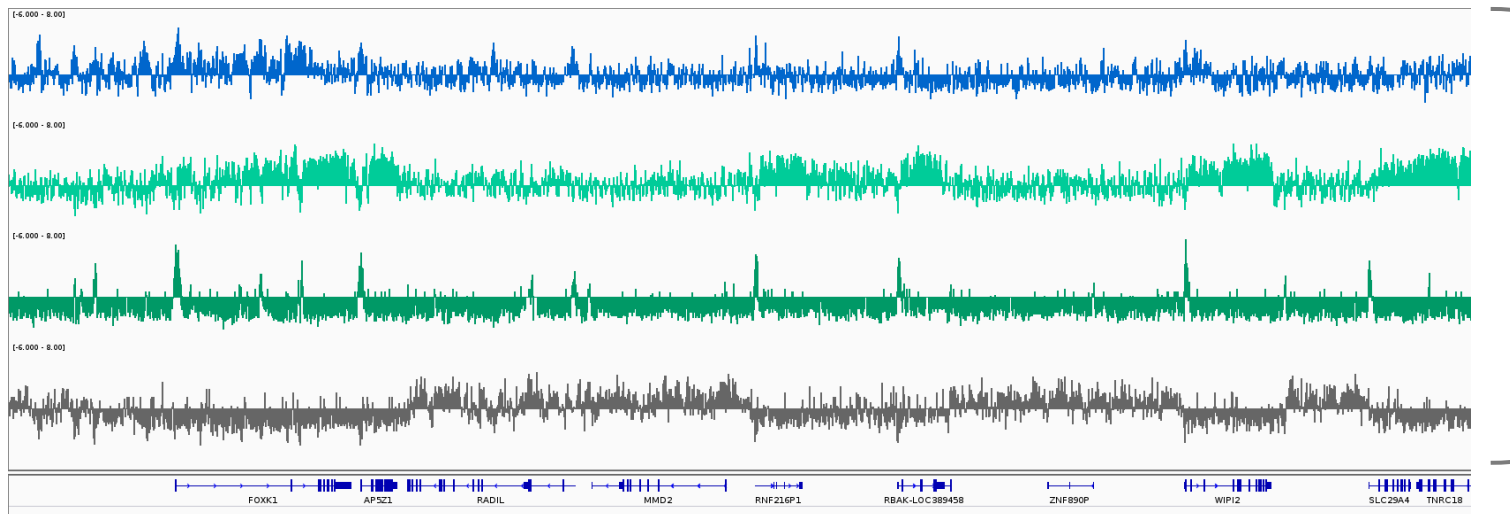
- *Data sharing & storage*
- *Visualization in Genome Browsers (e.g. IGV)*
- *More efficient downstream analyses*

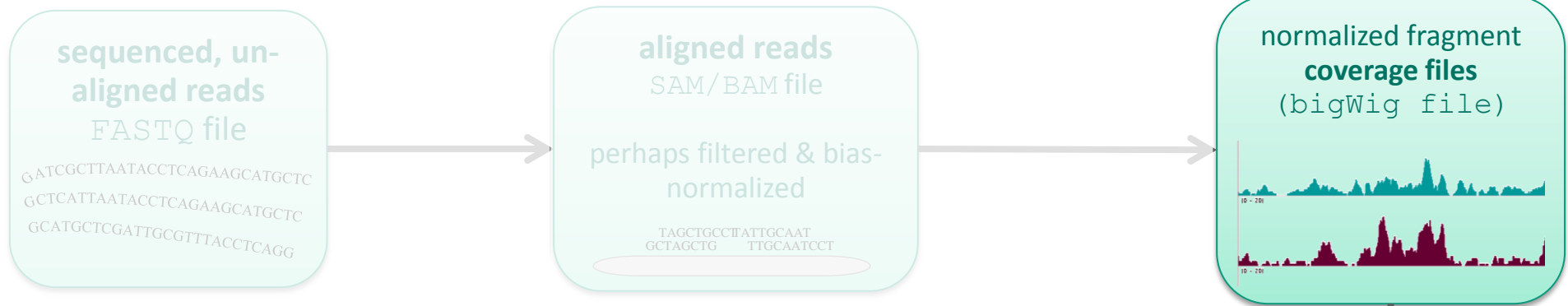


bamCompare

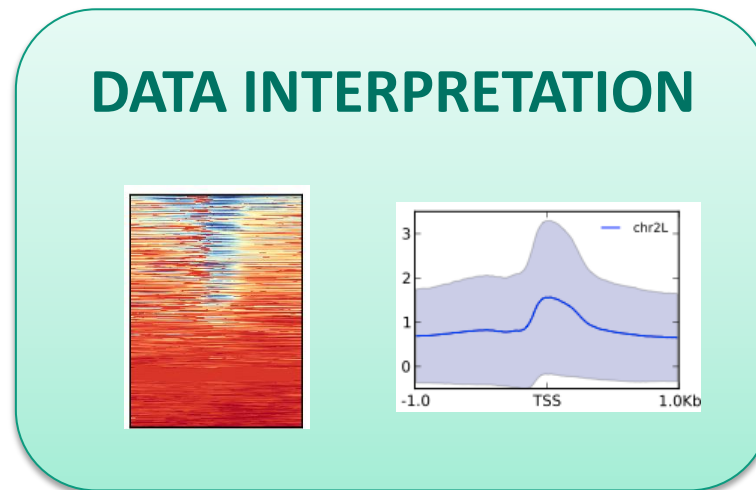


- Reported value:
 - Ratio of number of reads per bin
 - Log2 ratio
 - Difference
- Scaling:
 - Read counts
 - SES method by Diaz et al.



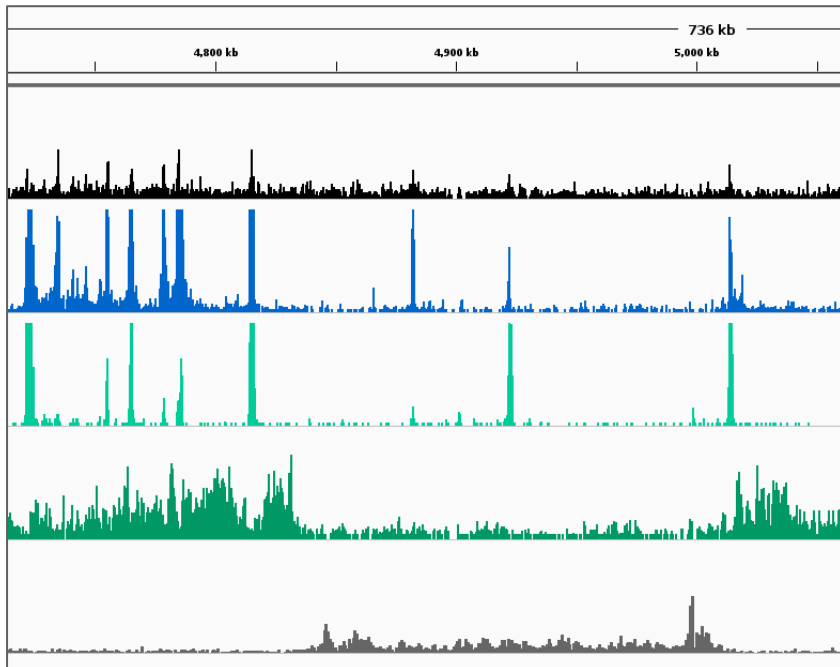


Visualization



Local to global

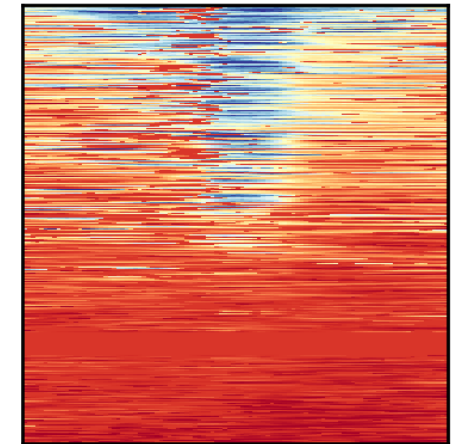

bigwig



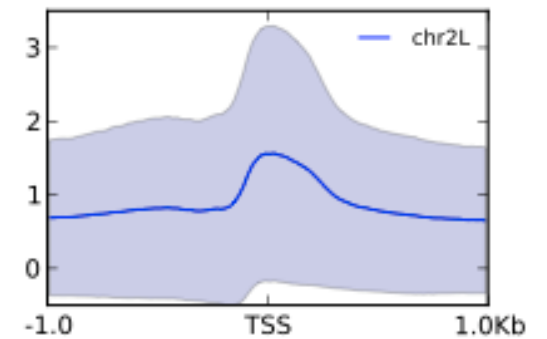
`computeMatrix`



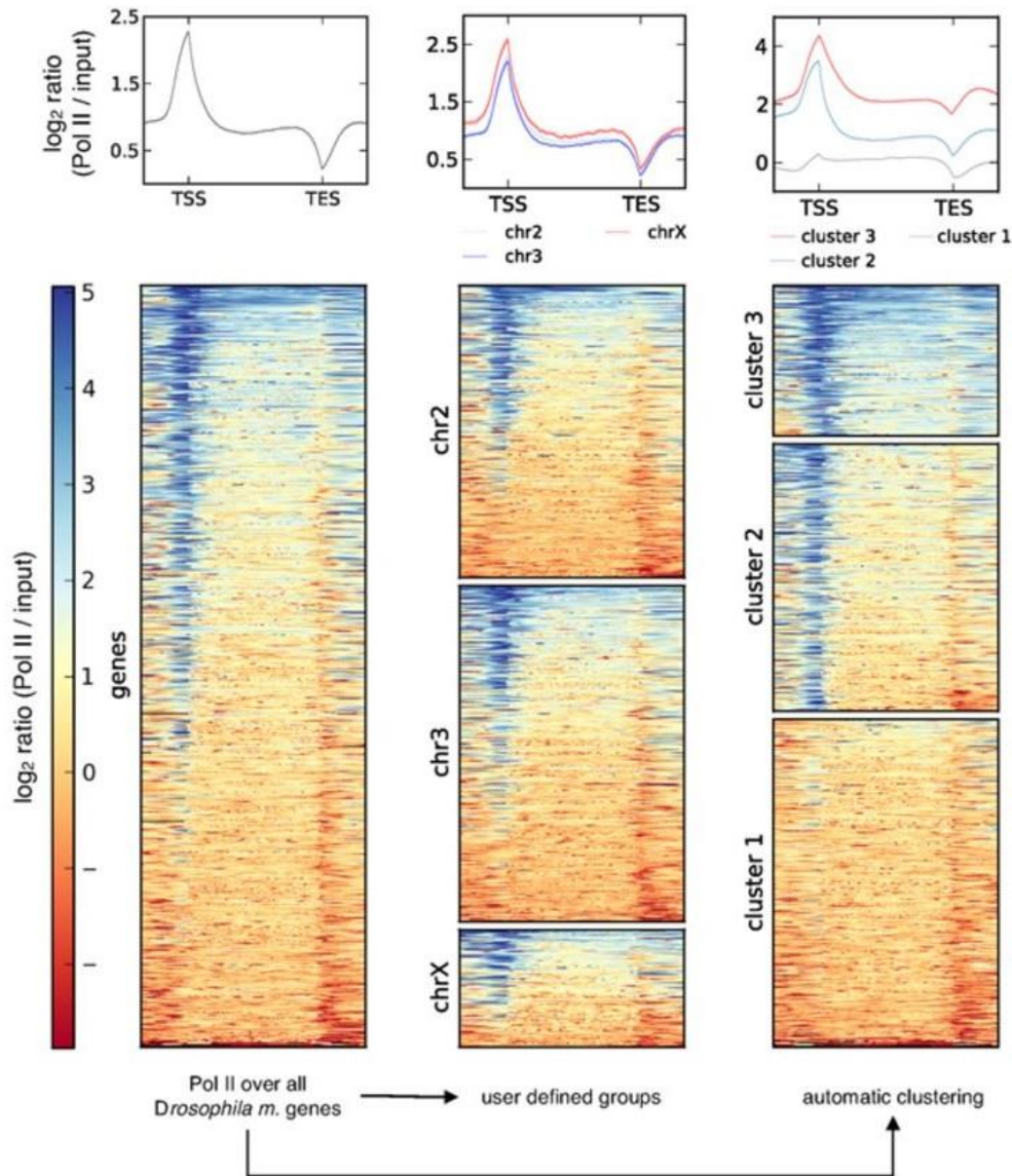
heatmapper



profiler



heatmapper



Implementation

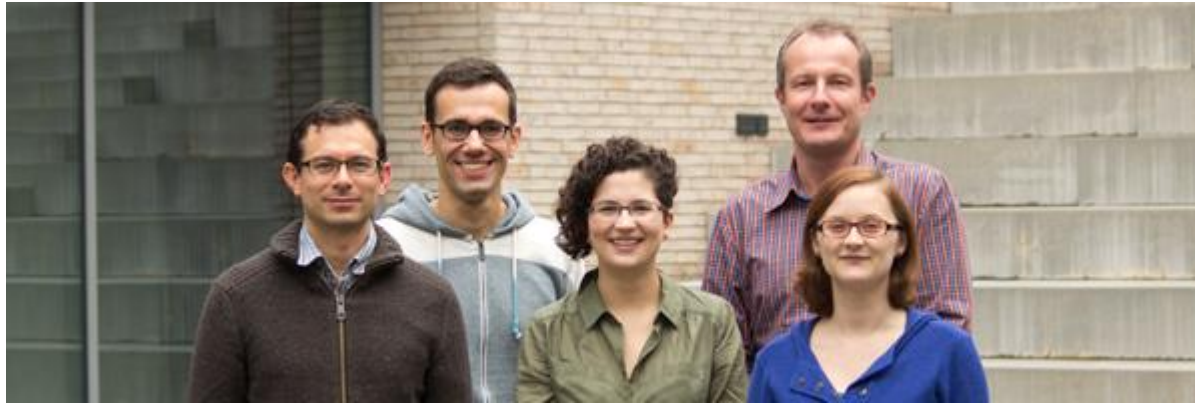
- Efficiency and highly parallelized processing
- Customized down-stream analyses (store intermediate data)
- Standardized output files
- Modular approach – compatibility, flexibility, scalability

- Automatic installation with dependencies
 - Command-line version: Python Package Index (easy_install, pip)
 - Galaxy: from main toolshed
 - Docker image

- Public Galaxy Server:
deepTools.ie-freiburg.mpg.de

Analyze more, process less!

Acknowledgements



MPI-IE

- Fidel Ramírez
- Friedrike Dünder
- Sarah Diehl
- Thomas Manke

More information & support:

deeptools.github.io

All users of deepTools for
their feedback

```
docker run -d -p 8080:80 bgruening/galaxy-deeptools
```