

Does color have structure?
**Modeling 3D domains of
the fly genome.**

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Genome Biology Group (CNAG)
Structural Genomics Group (CRG)

***iCrea**
INSTITUCIÓ CATALANA DE
RECERCA I ESTUDIS AVANÇATS



Pastene

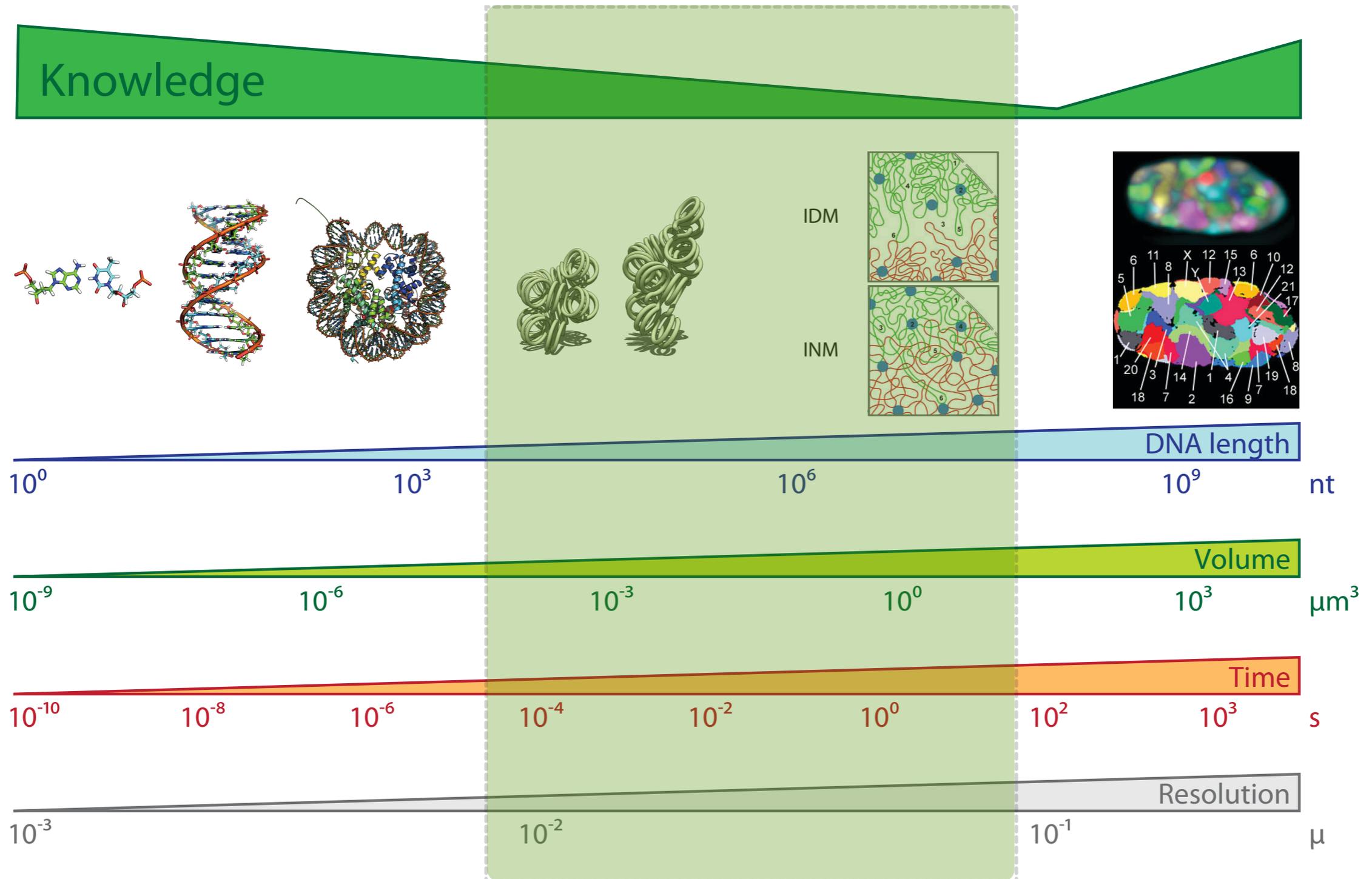
IMPORTED FROM ITALY

CAPPELLI D'ANGHINI - SOFT HANDY AS

MADE IN ITALY

Resolution Gap

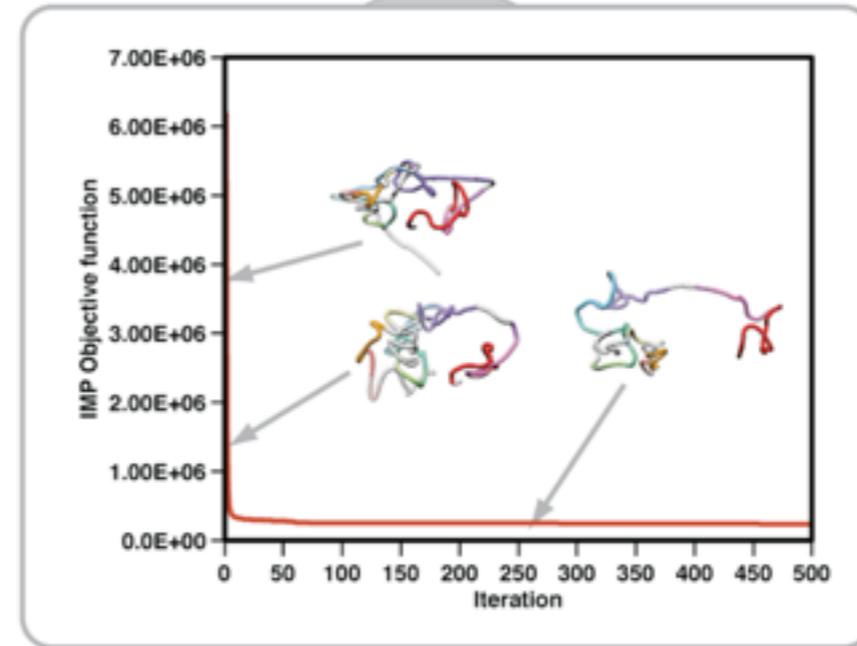
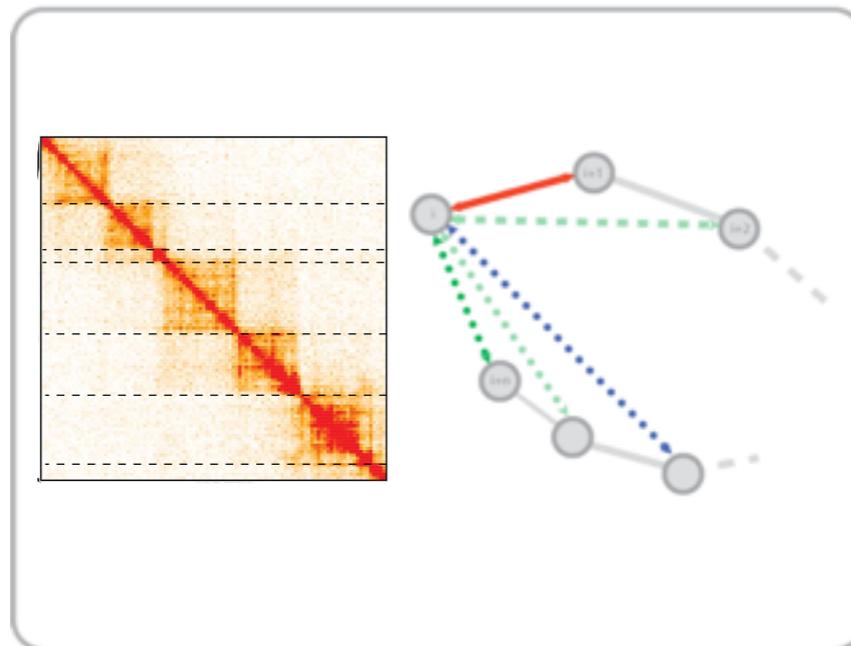
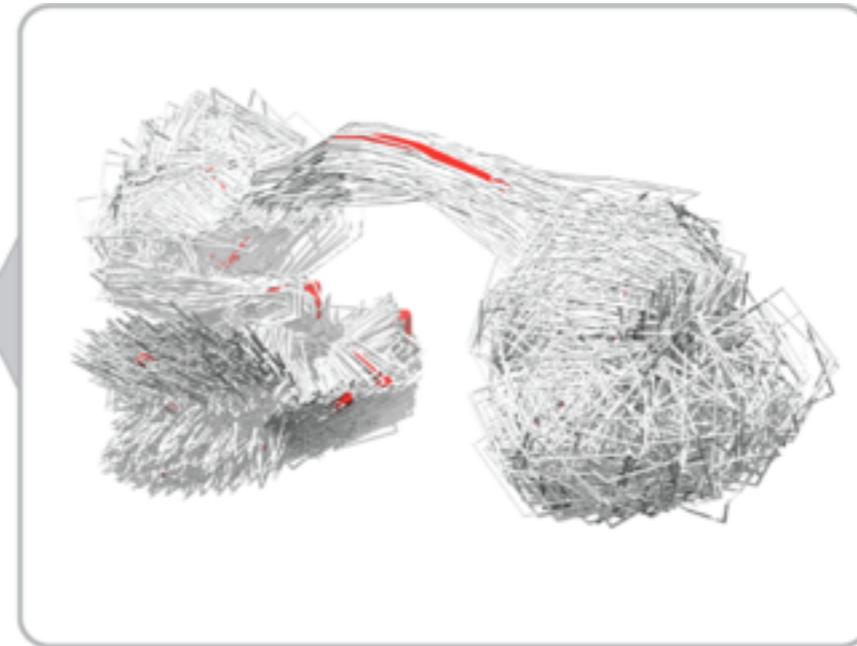
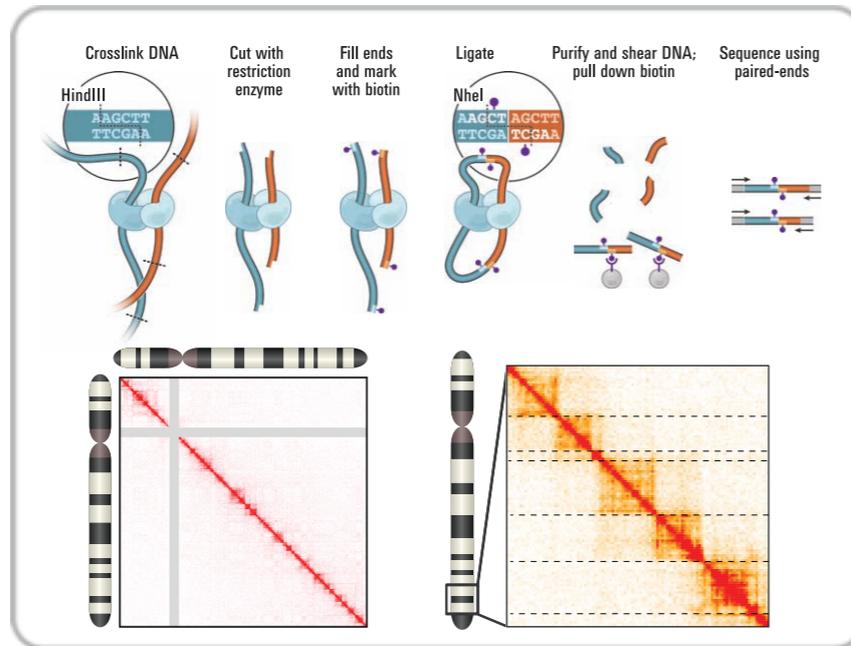
Marti-Renom, M. A. & Mirny, L. A. PLoS Comput Biol 7, e1002125 (2011)



Hybrid Method

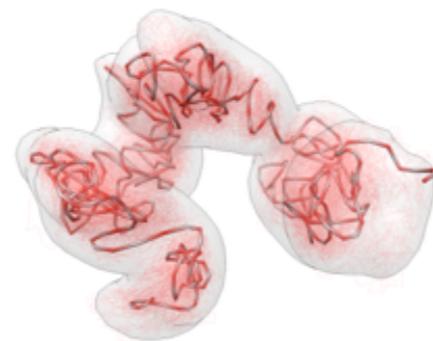
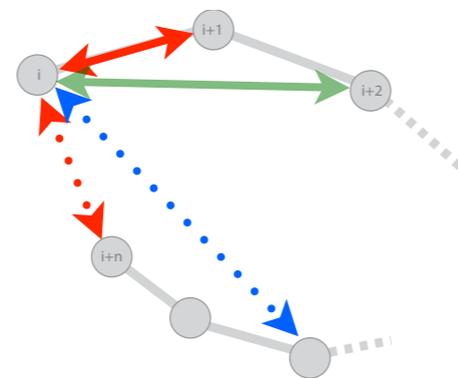
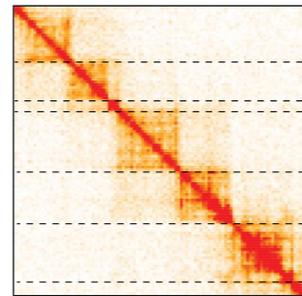
Baù, D. & Marti-Renom, M. A. *Methods* 58, 300–306 (2012).

Experiments



Computation

Label Sequence
@FCR3USP02A3WD1
CCGTCAATTCATTTAAGTTTAACTTGCGGCCGTACTCCCAGGCGGT
*
AAAAAAAAA:99@: : : ? ? @ : : FFANAAACCA: : : BB@?A?
Q scores (as ASCII chart)
Base=T, Q='!'=25



FastQ files to Maps

Map analysis

Model building

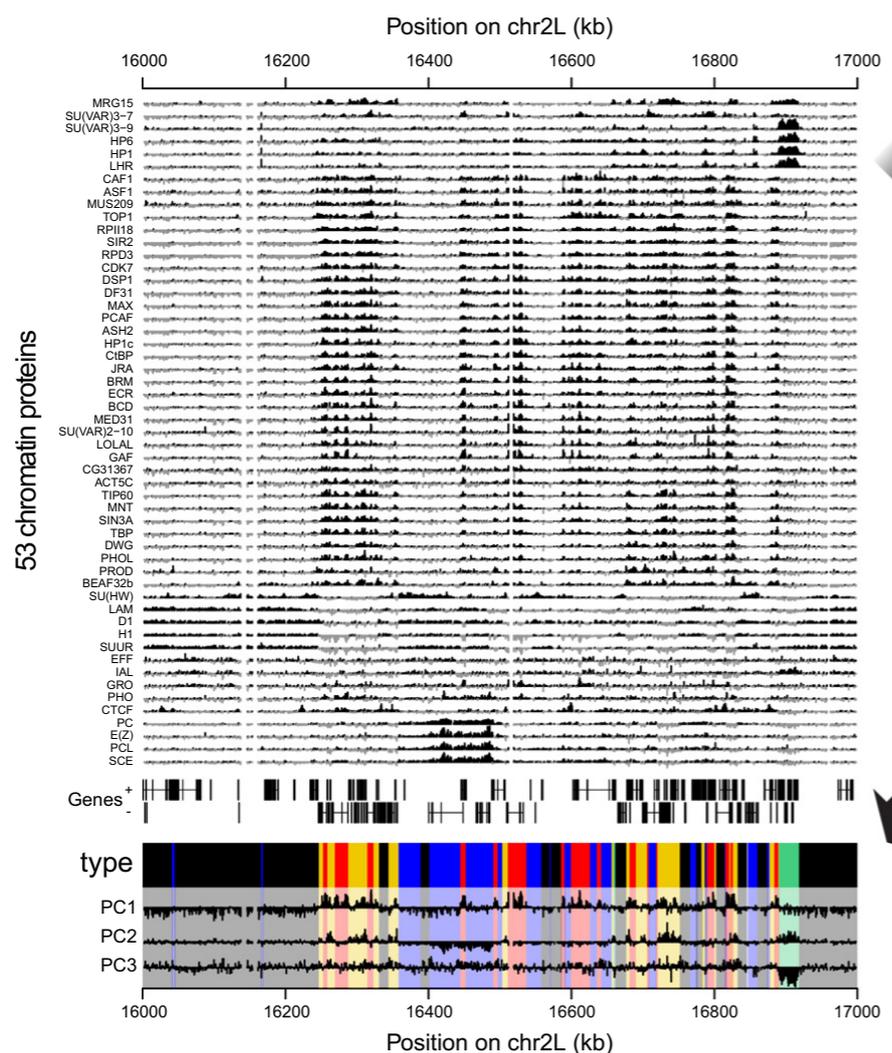
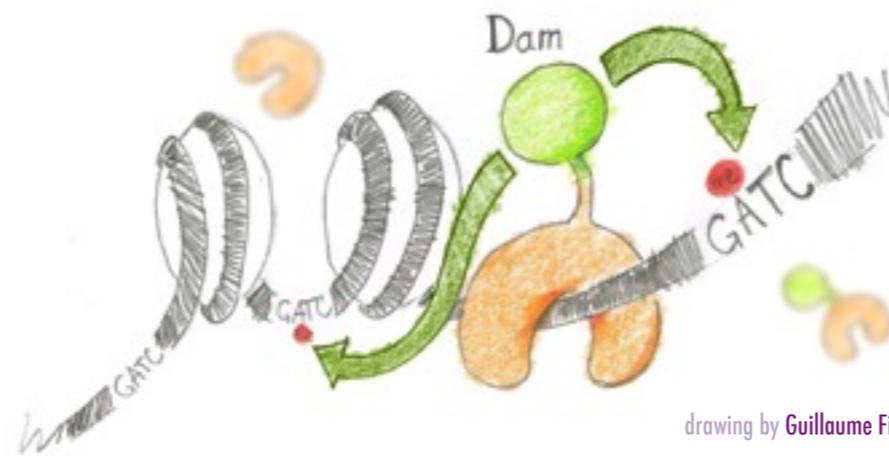
Model analysis

Structuring the **COLORs** of chromatin

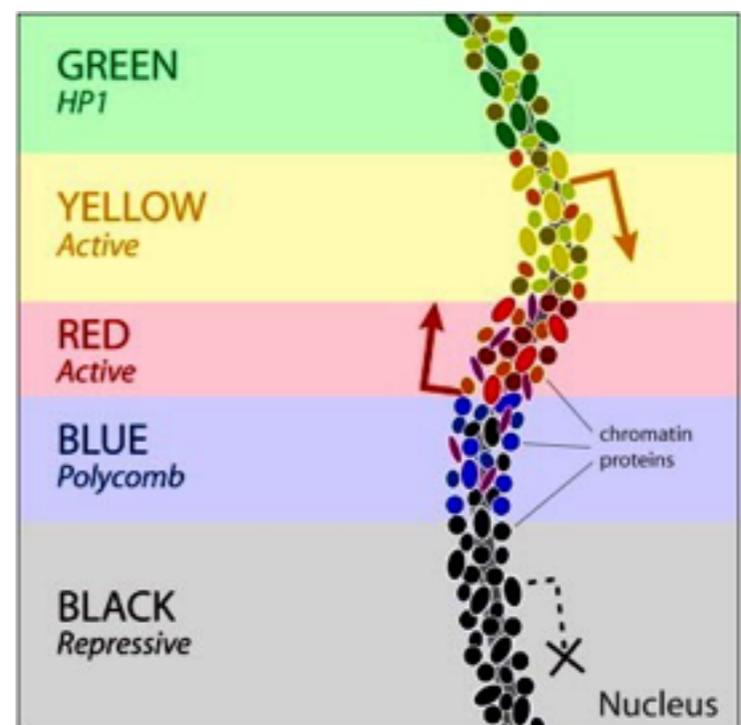
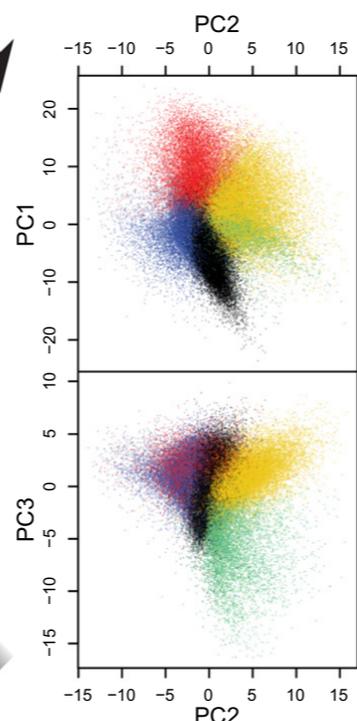


Fly Chromatin COLORs

Filion et al. (2010). Cell, 143(2), 212-224.



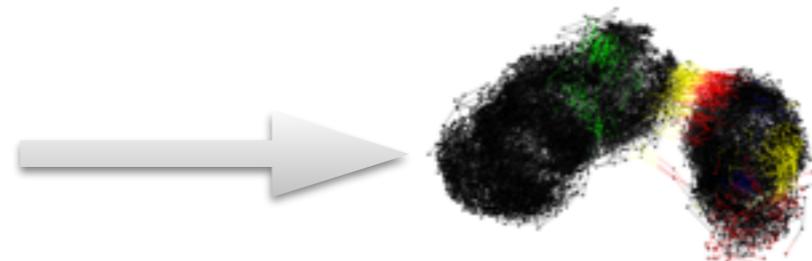
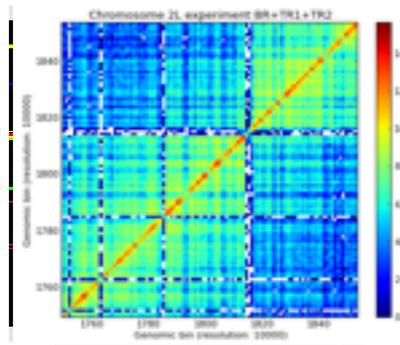
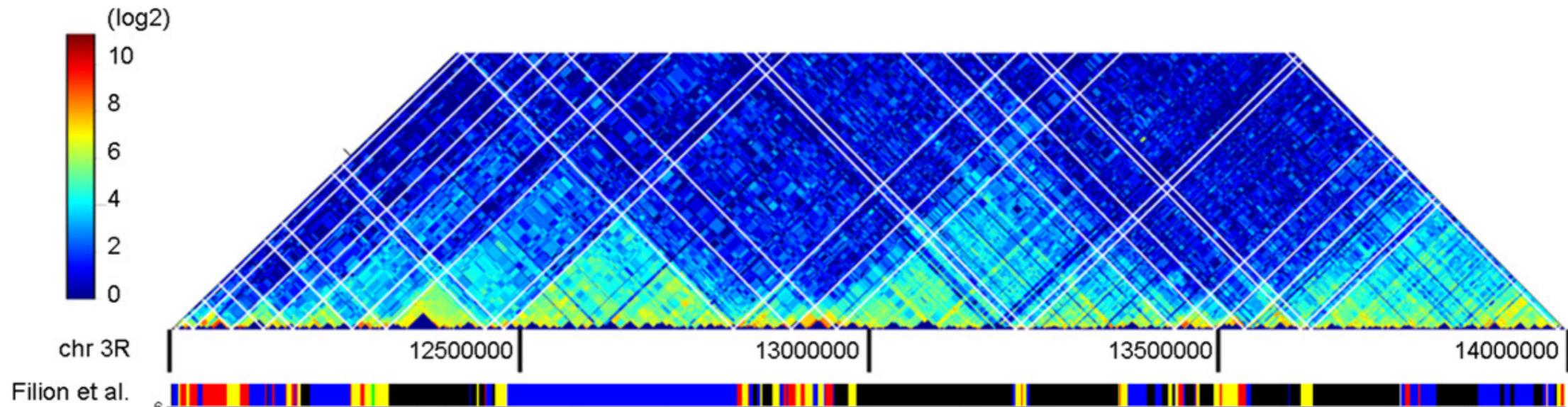
Principal component analysis



Hidden Markov model

Functional COLORs

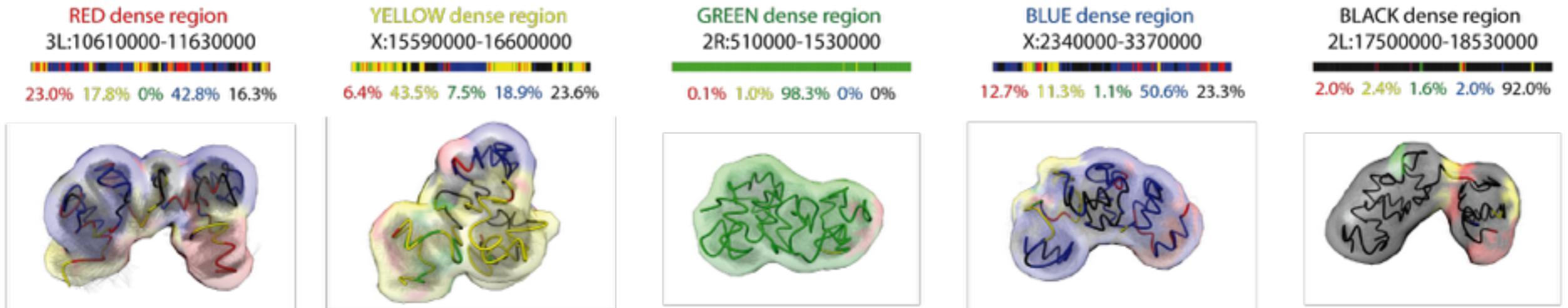
Hou et al. (2012). *Molecular Cell*, 48(3), 471–484.



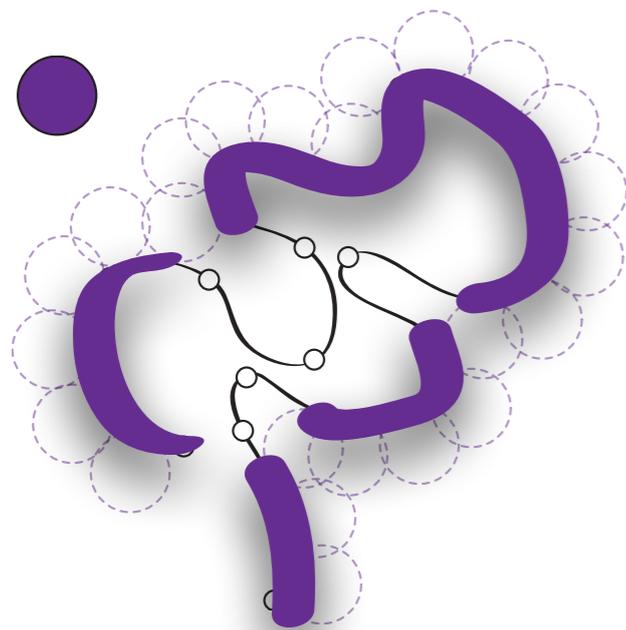
50 ~1Mb regions
10 for each color

Structural properties

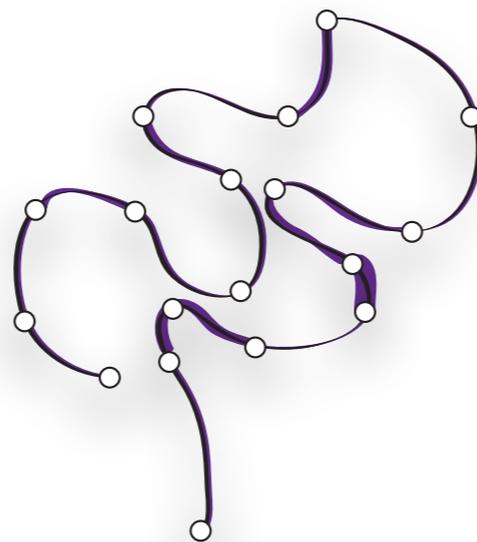
50 1Mb regions. 10 enriched for each color.



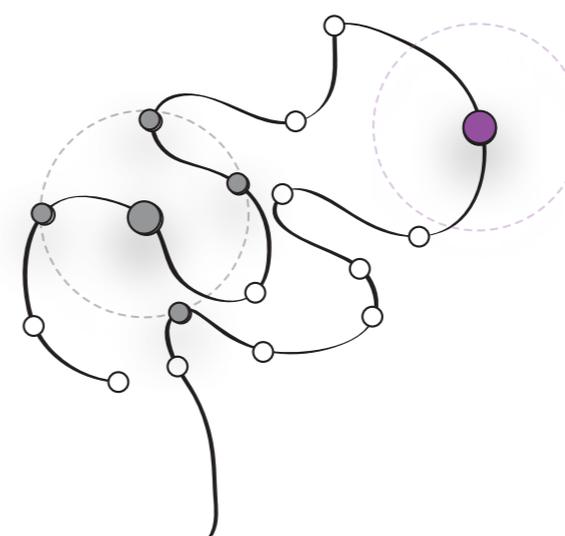
Accessibility (%)



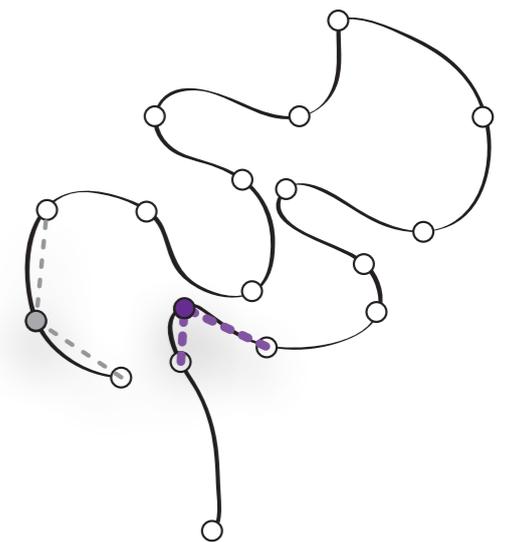
Density (bp/nm)



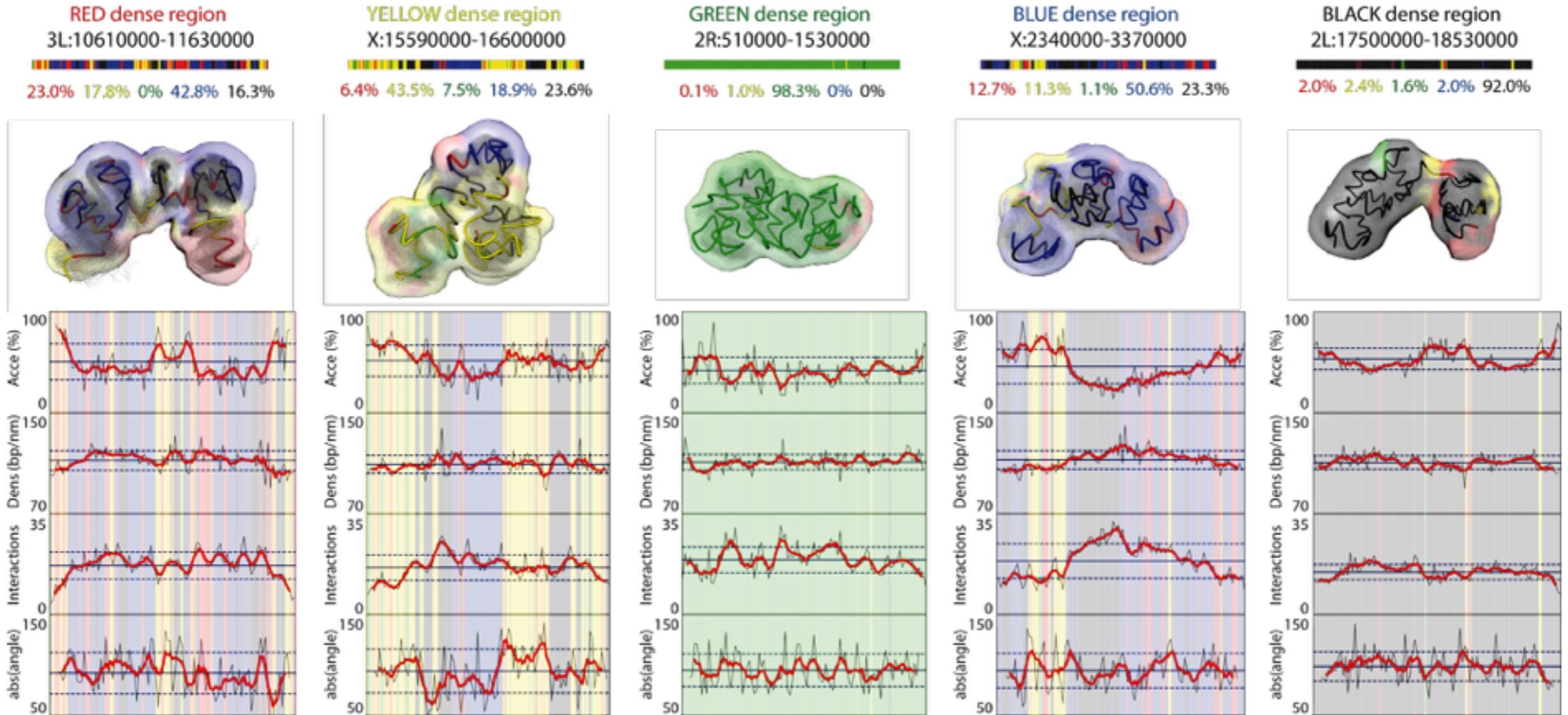
Interactions



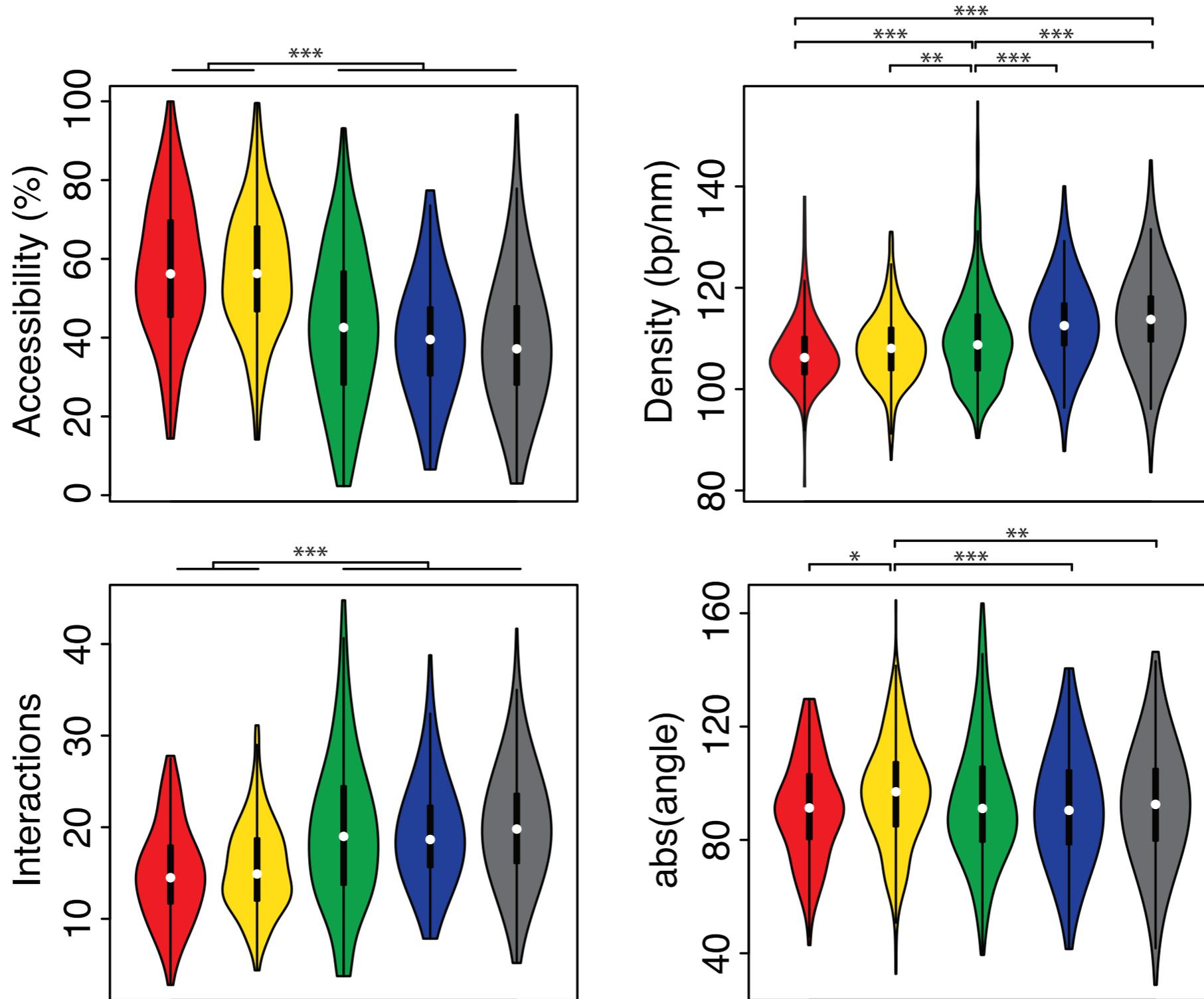
Angle



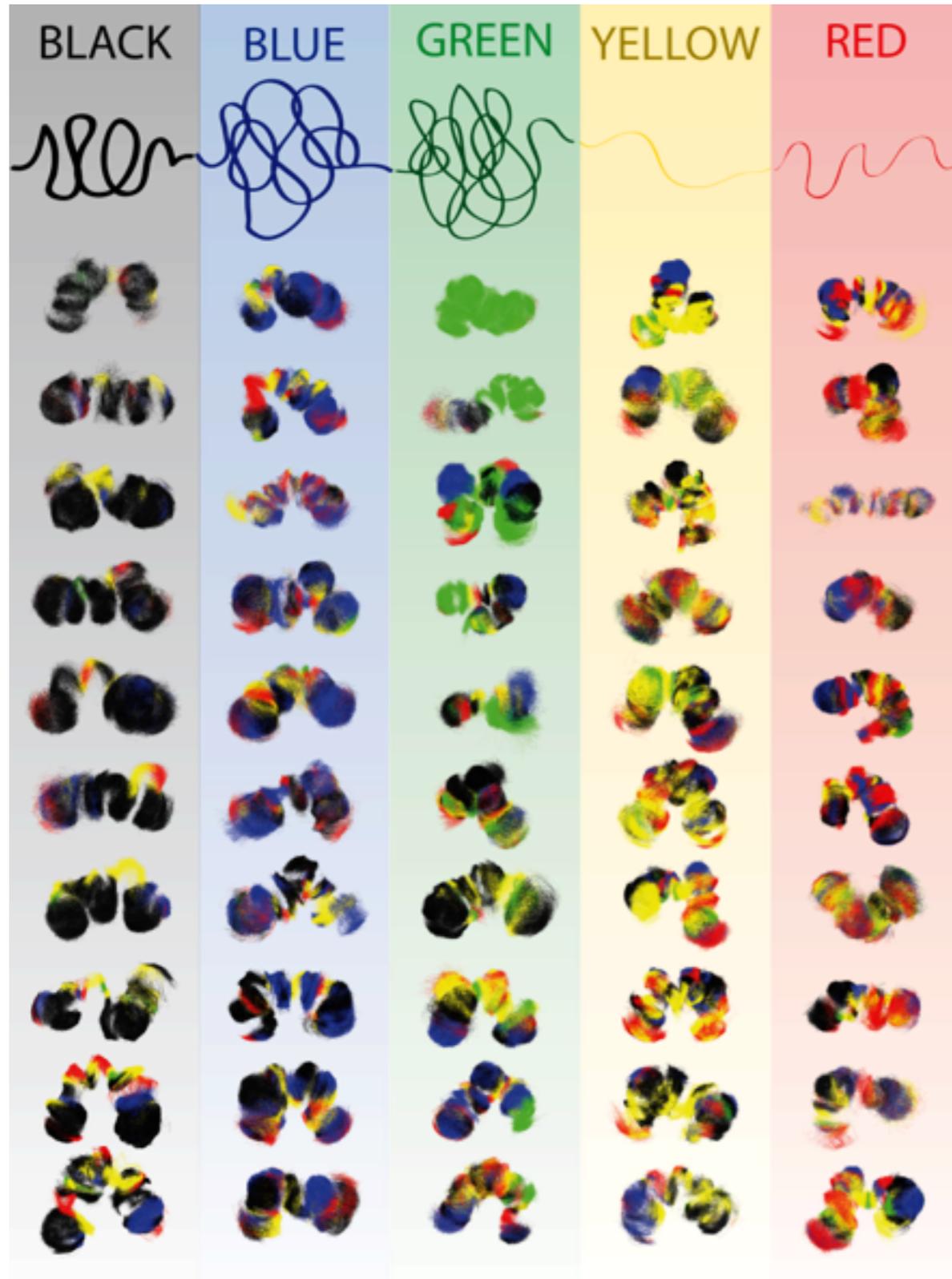
Structural COLOrS



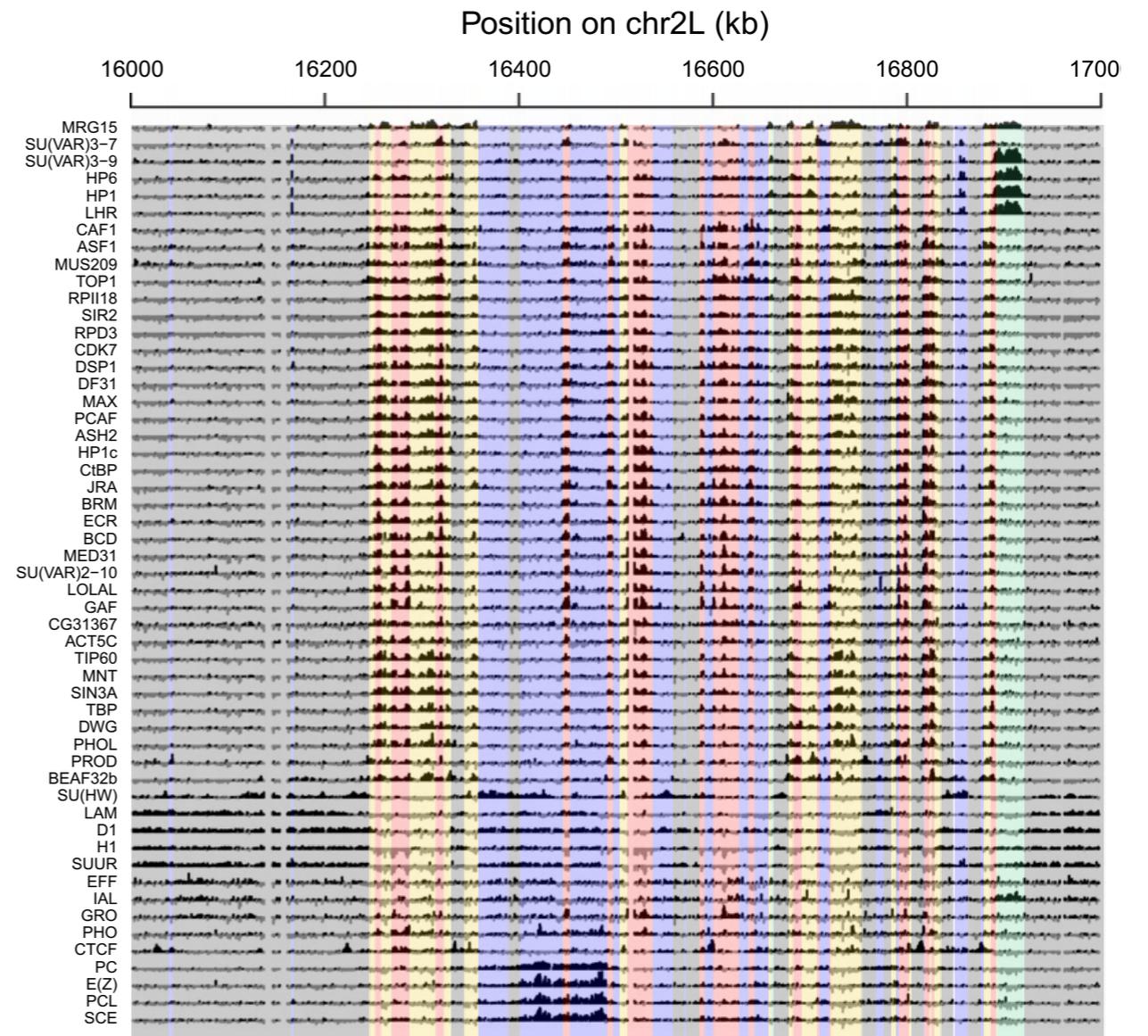
Structural **CO**LO**R**s



Structural COLORs



53 chromatin proteins



<http://3DGenomes.org>

3DGenome tools @ CNAG/CRG [home]

Tools for modeling and analyzing 3D genomes.



TADbit

Building 3D genomes.

TADbit is a computational package that uses 3C-based data to detect, model and analyze the structure of genomes and genomic domains.



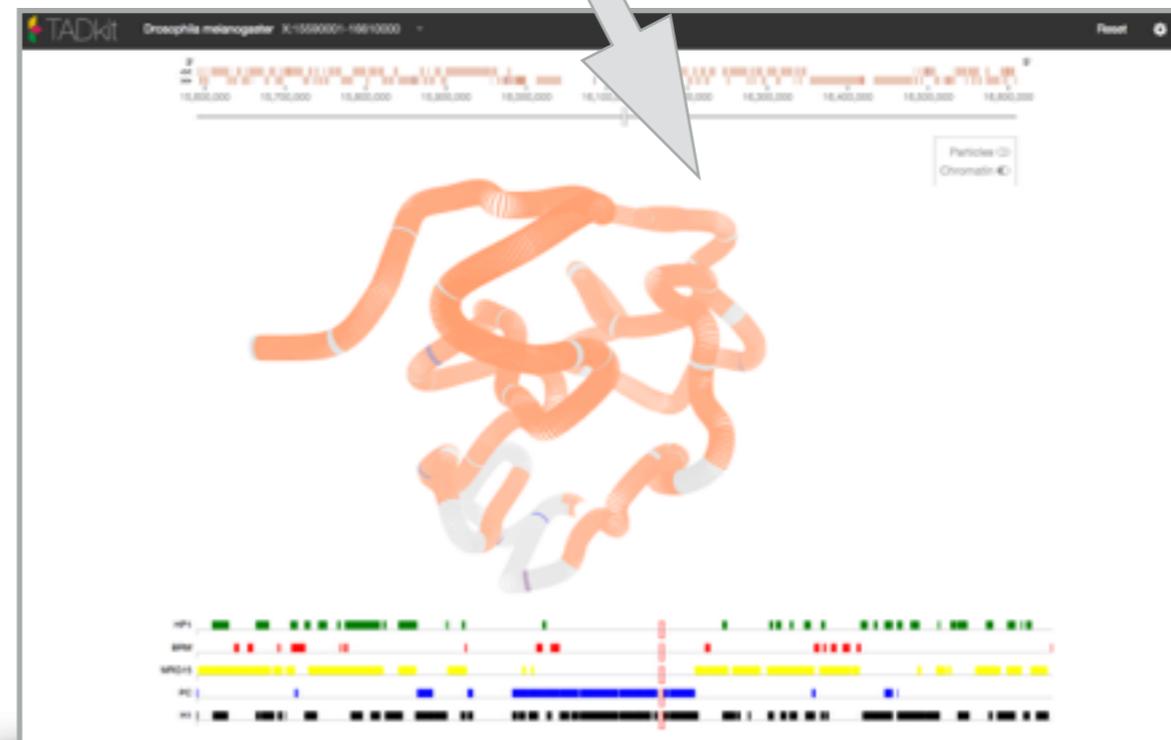
TADkit

Visualizing 3D genomes.

TADkit is a visualizer for 3D genomic data that helps researchers to easily annotate 3D models generated by TADbit. This software is under development.

TADbit and TADkit are developed by the Structural Genomics Team @ CNAG · CRG in Barcelona.

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Shameless promotion...



March 24th, Boston



November 23th-27th, Lisbon



<http://vizbi.org/2015>



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