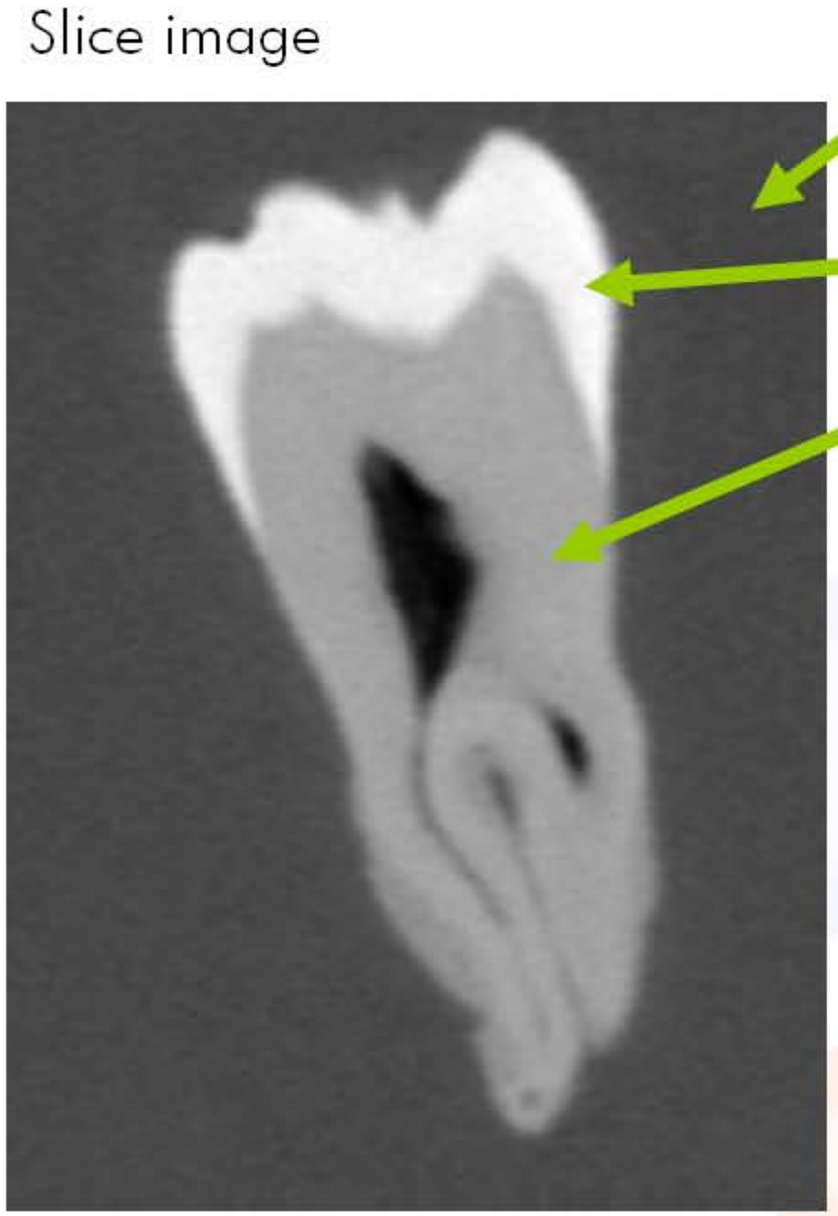
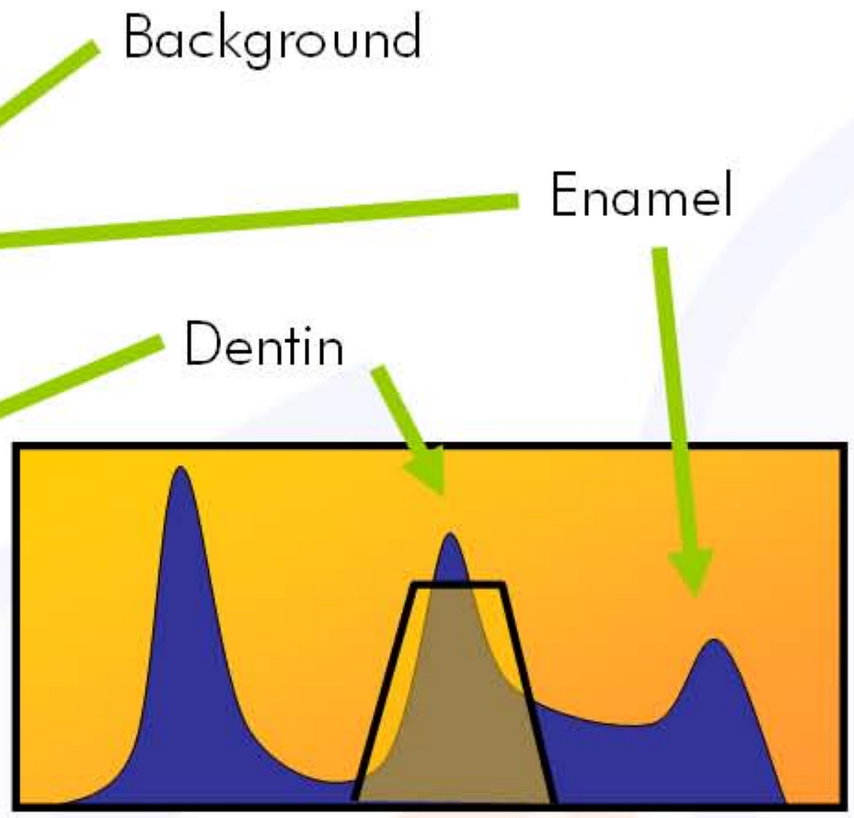
Real-Time Volume Graphics

[10] Transfer Functions Reloaded

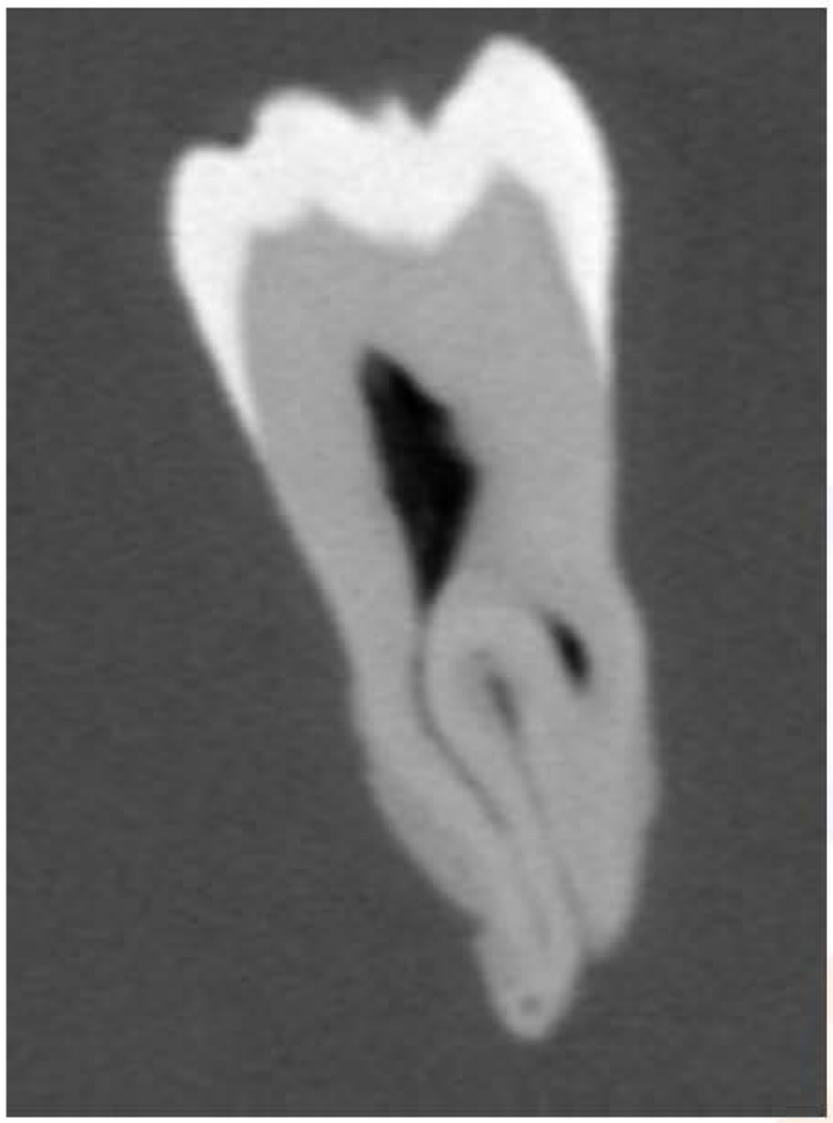
Transfer Function

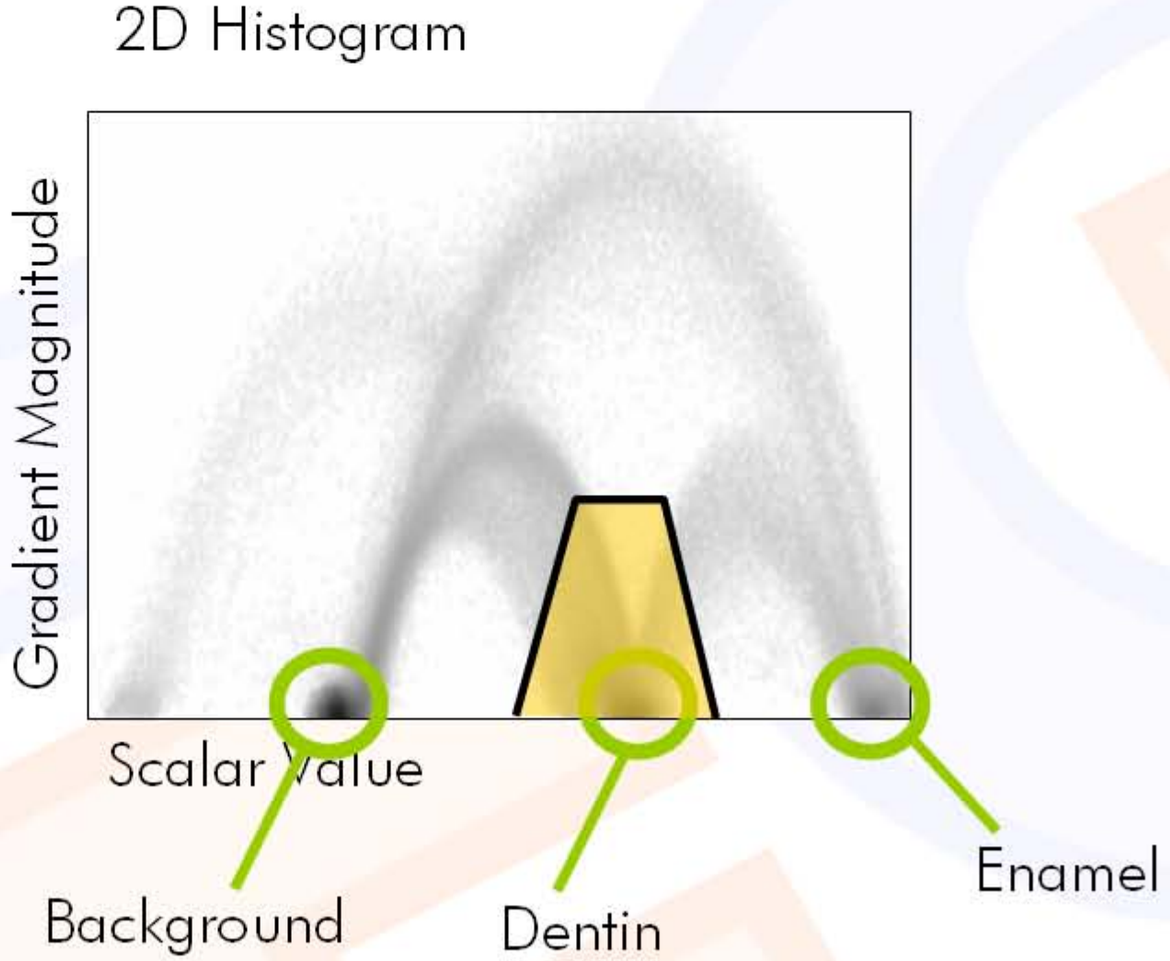




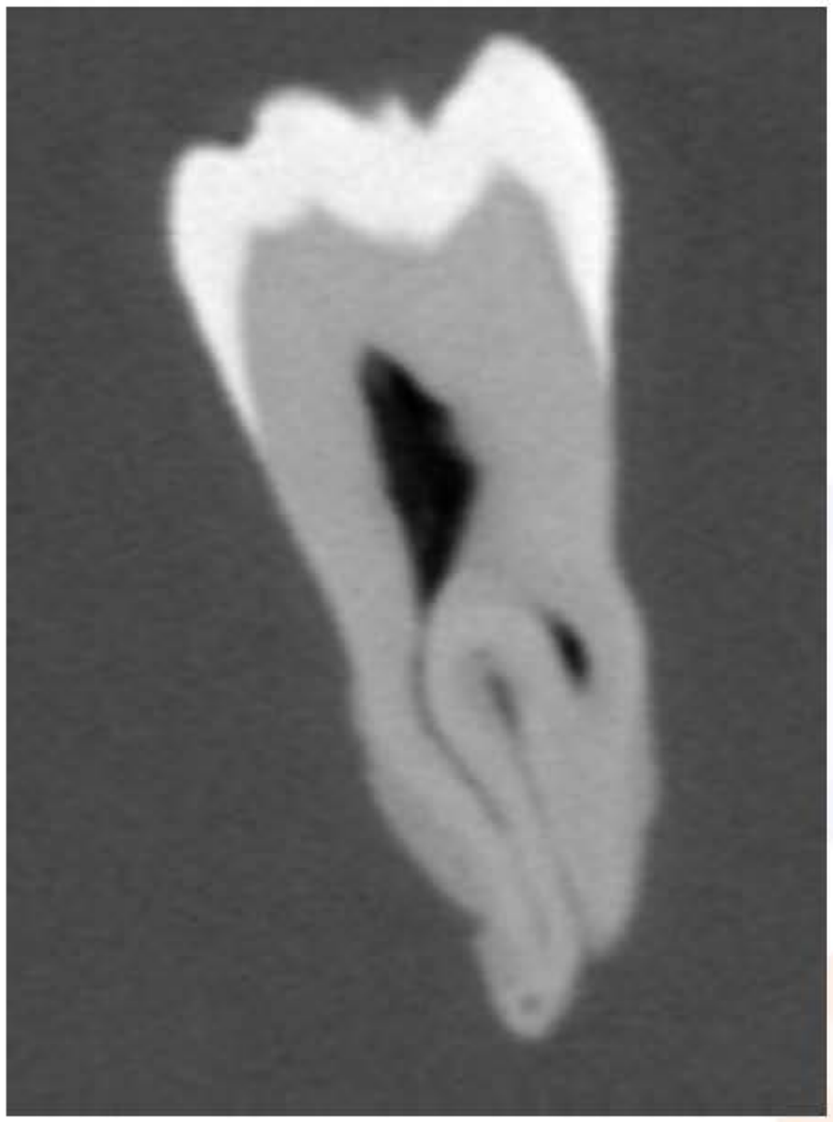
Histogram

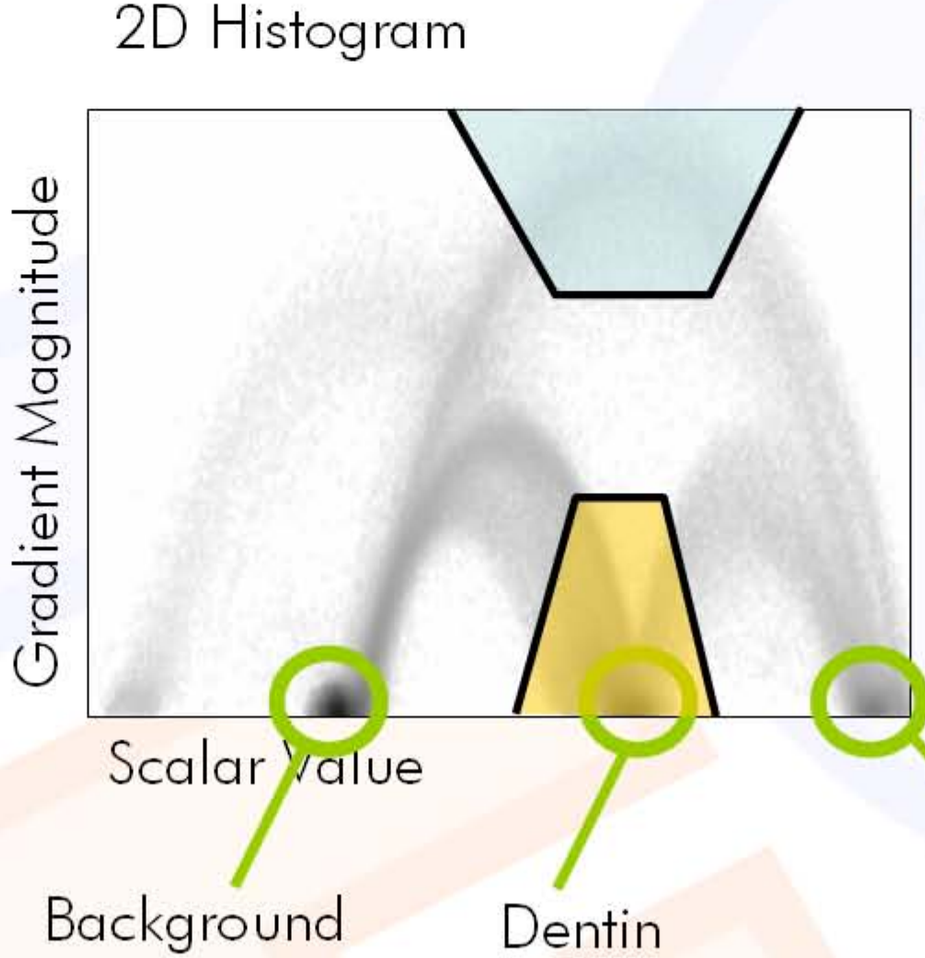
2D Transfer Function





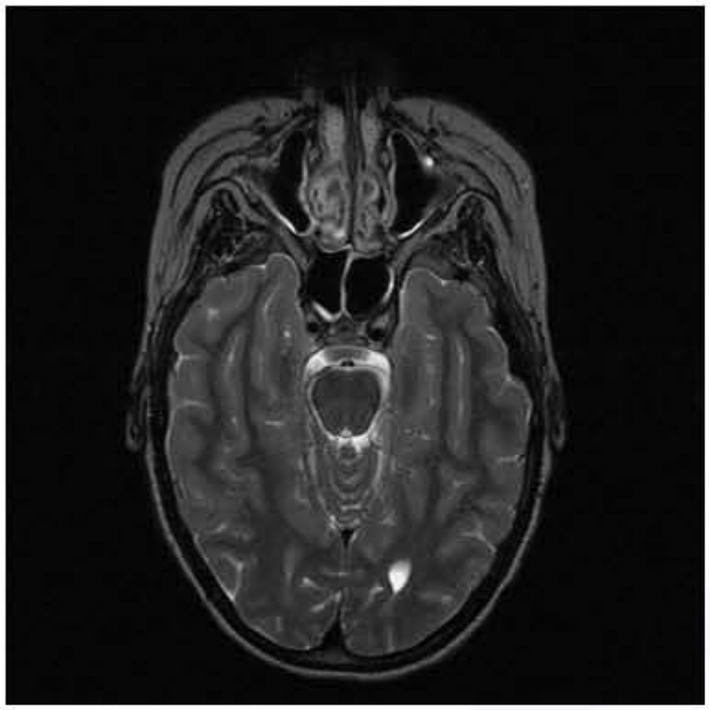
2D Transfer Function

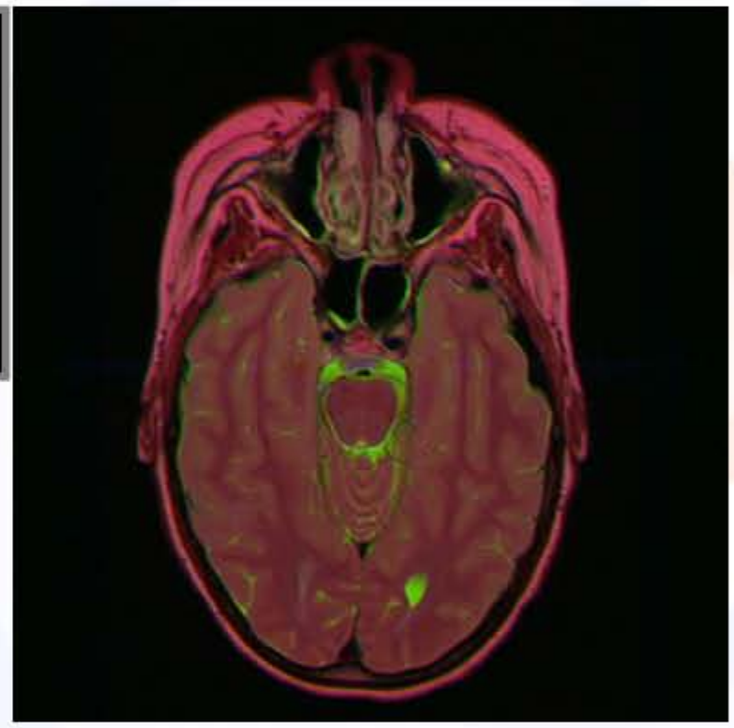


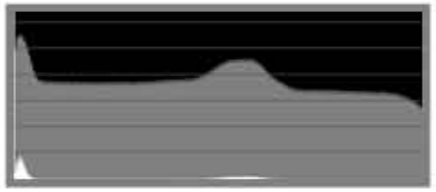


2D Transfer Functions

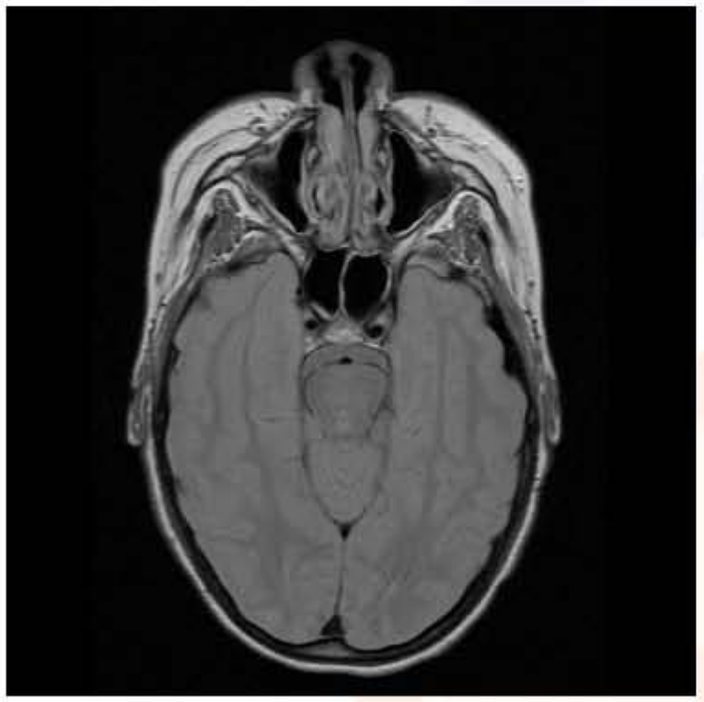
T2



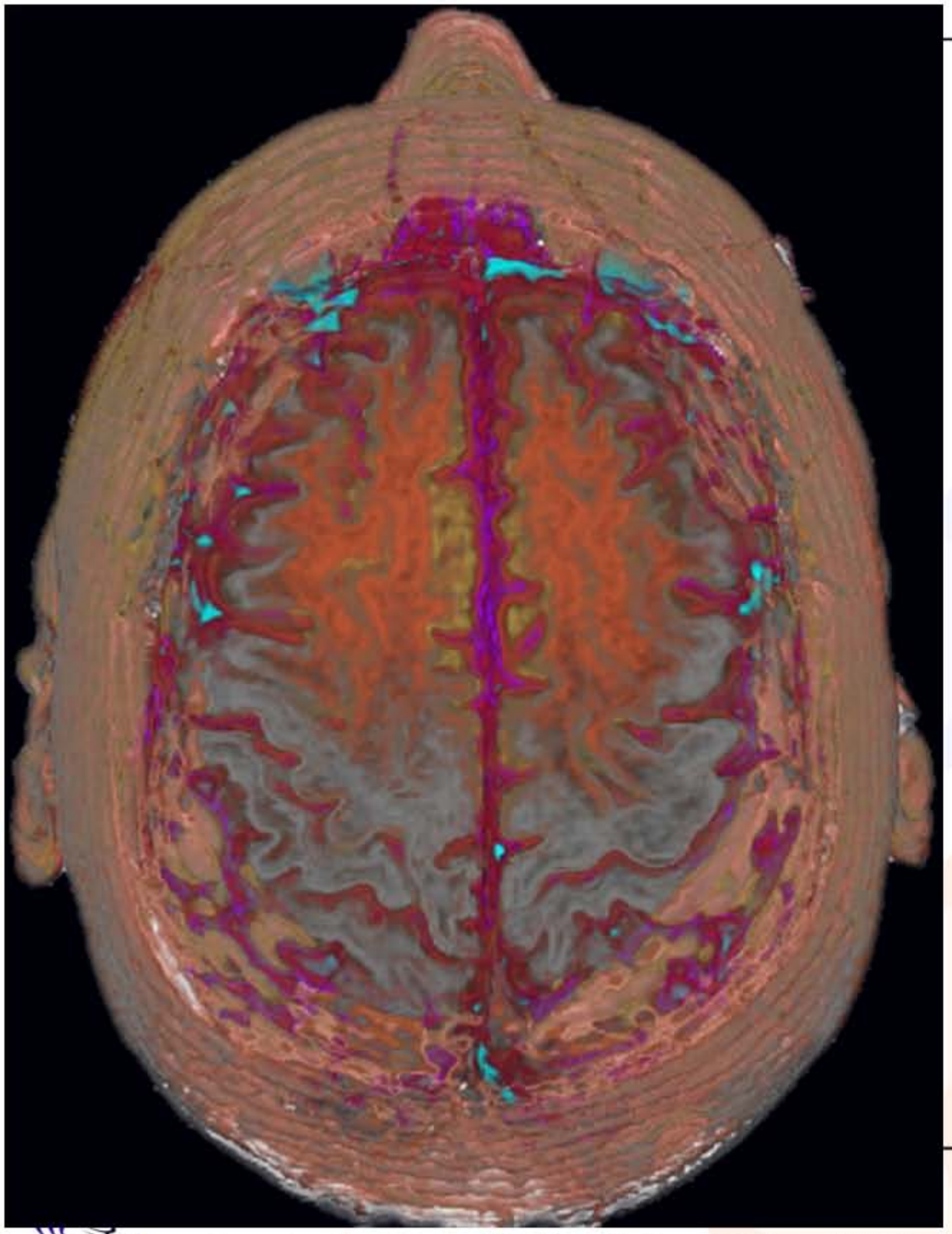


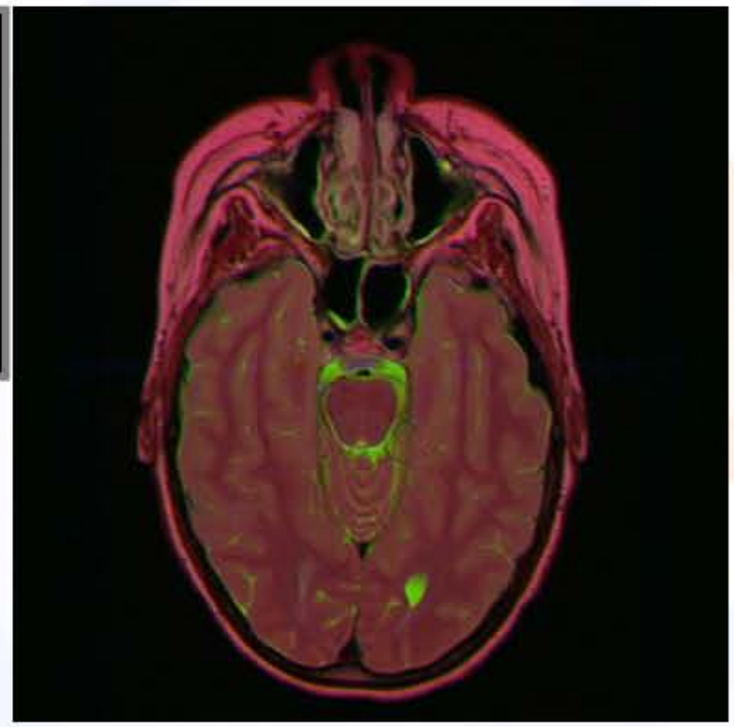


PD

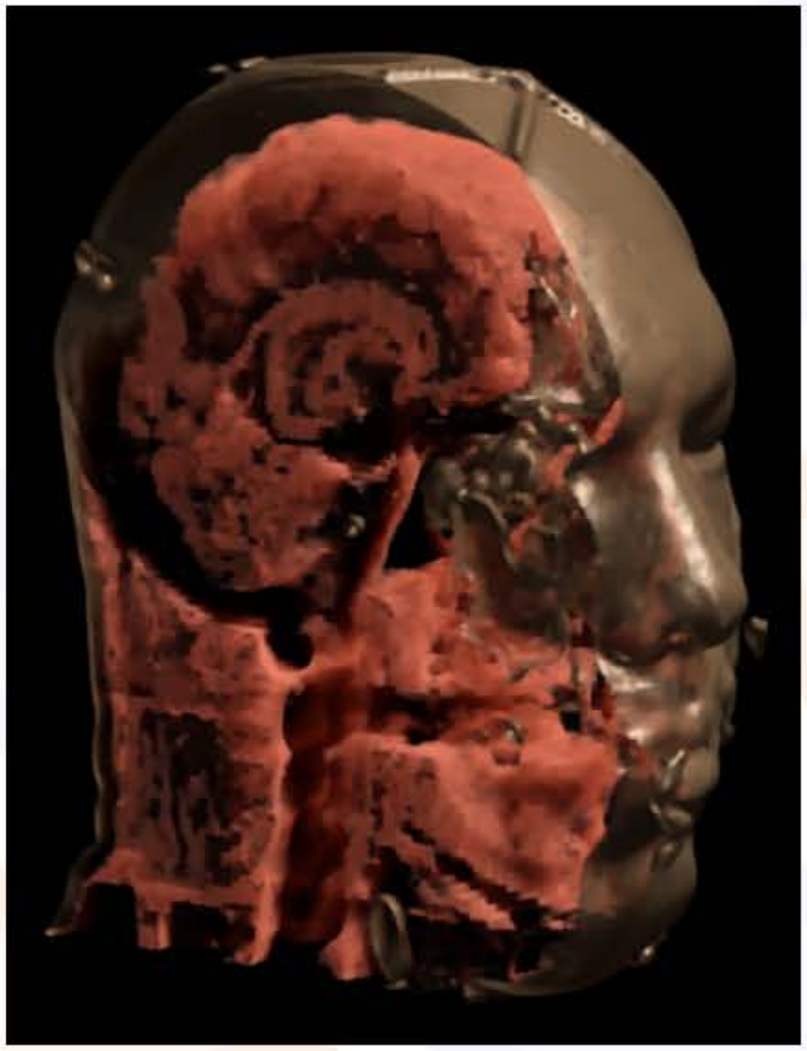


2D Transfer Functions

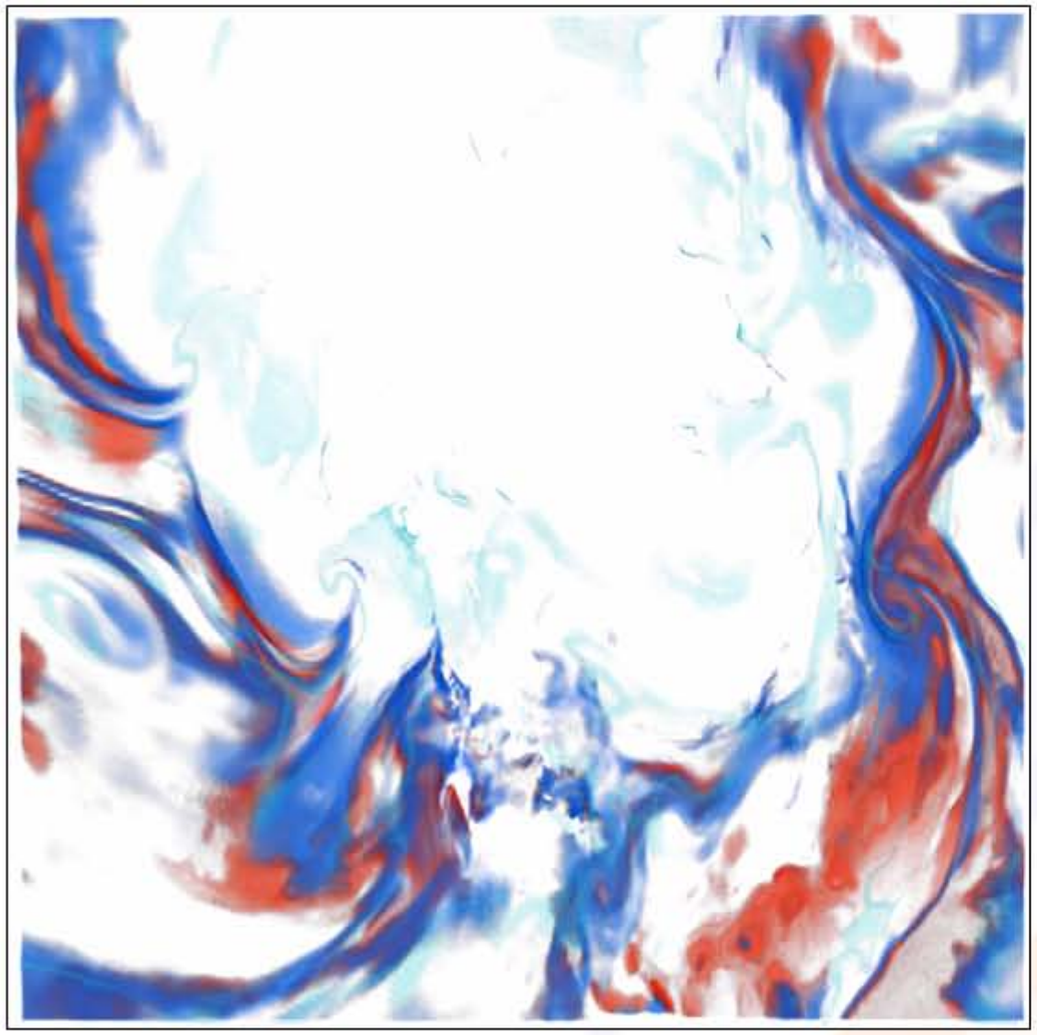




Multidimensional Transfer Functions

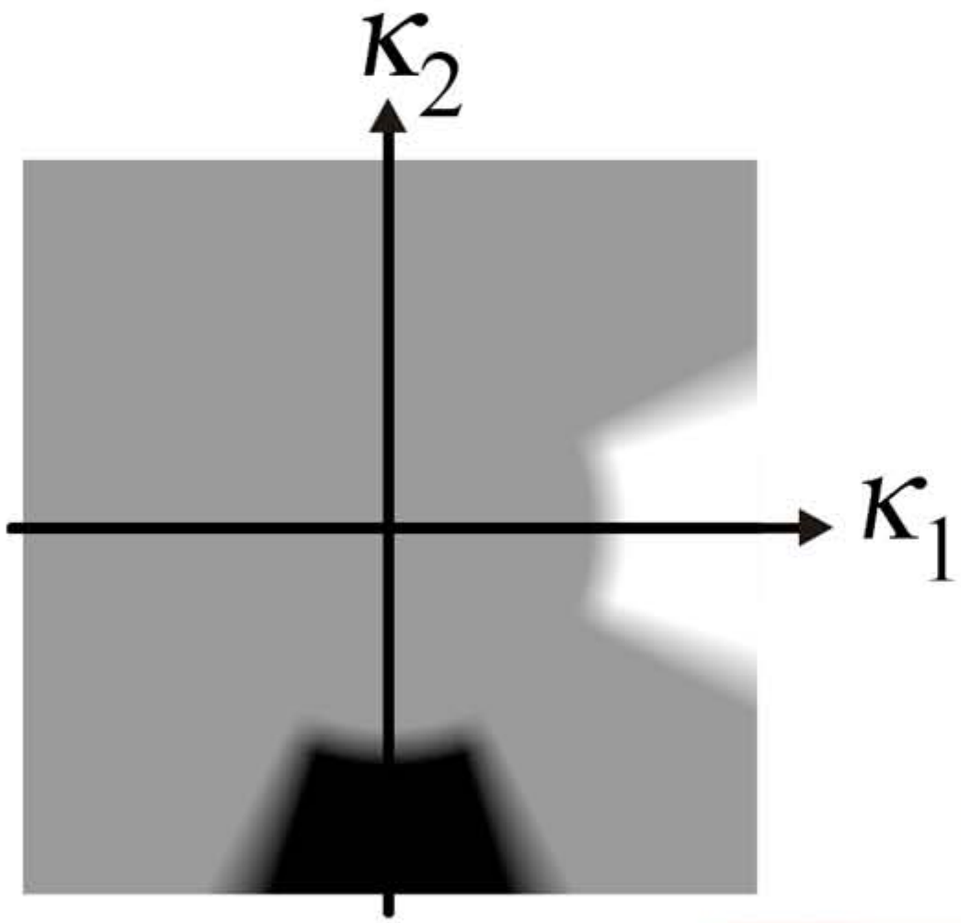


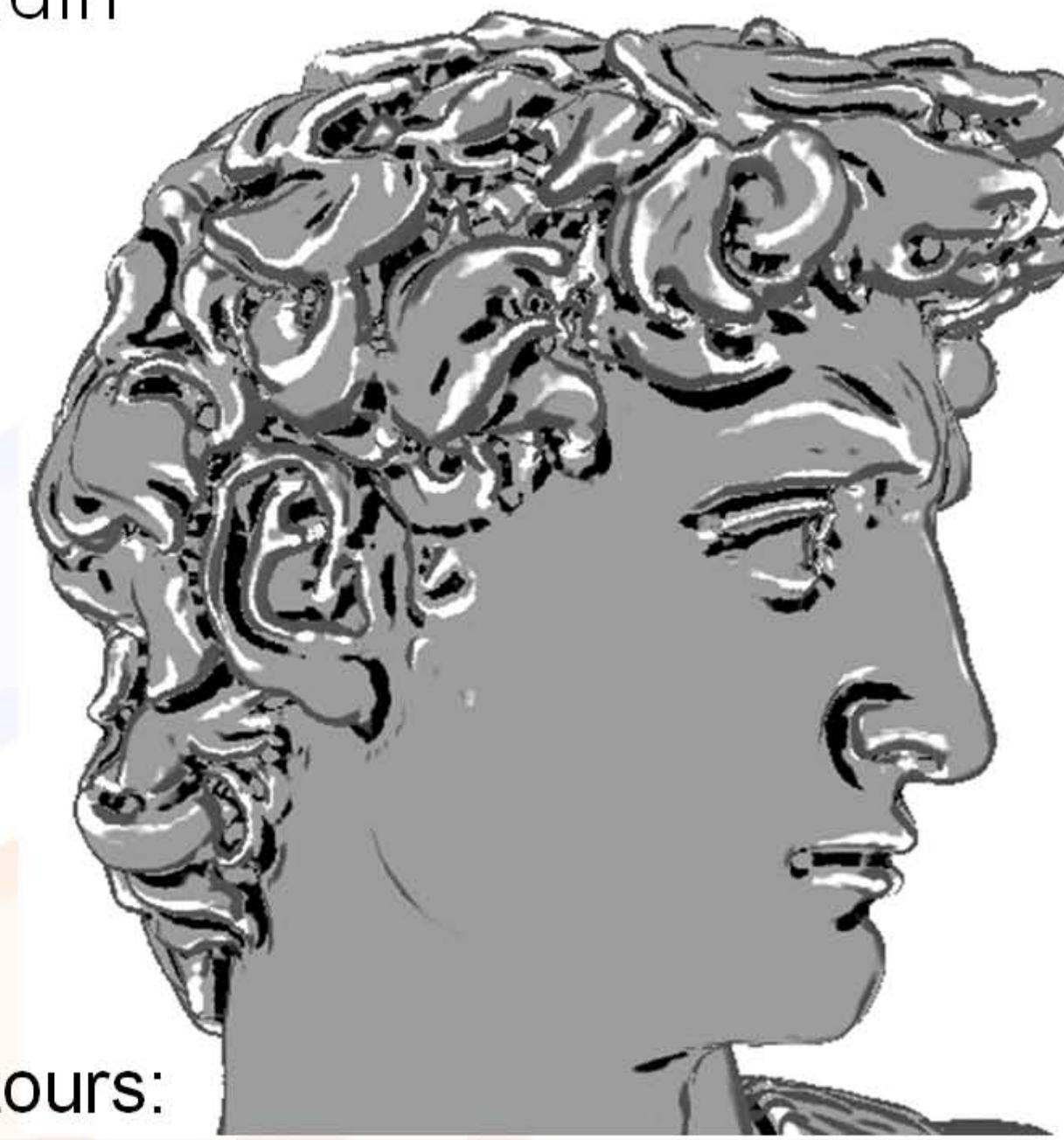
Multidimensional Transfer Functions



2D Curvature Transfer Functions

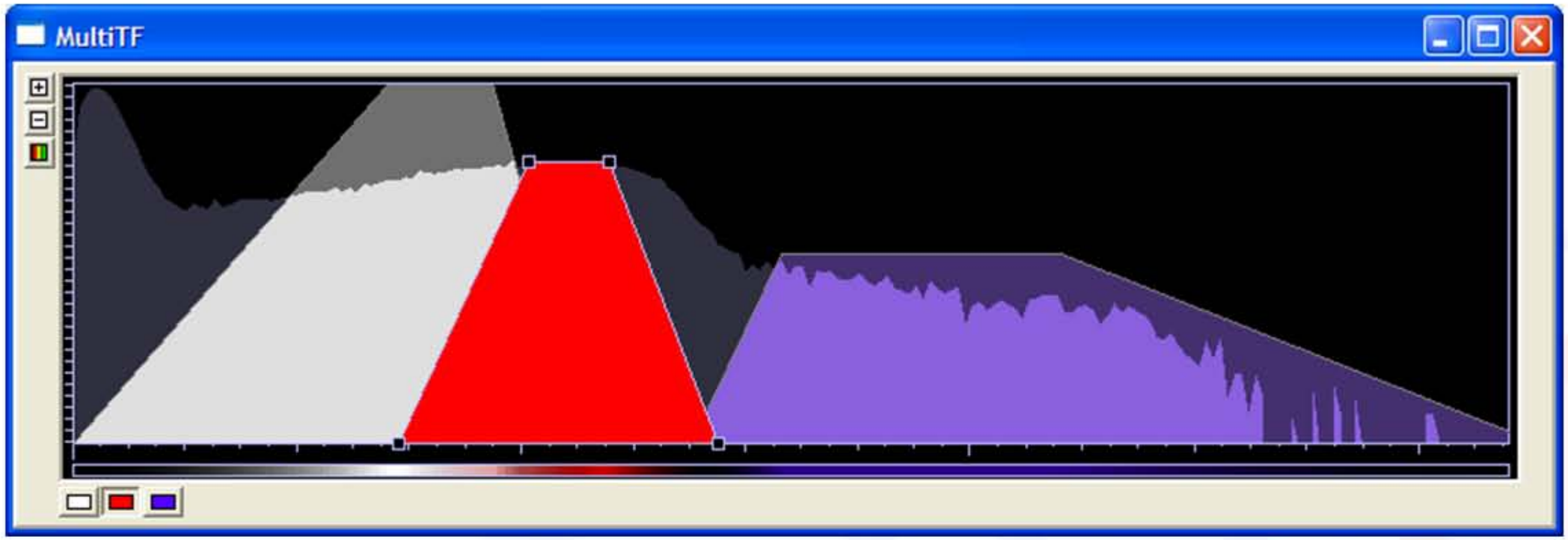
- 2D lookup table in domain of principal curvatures

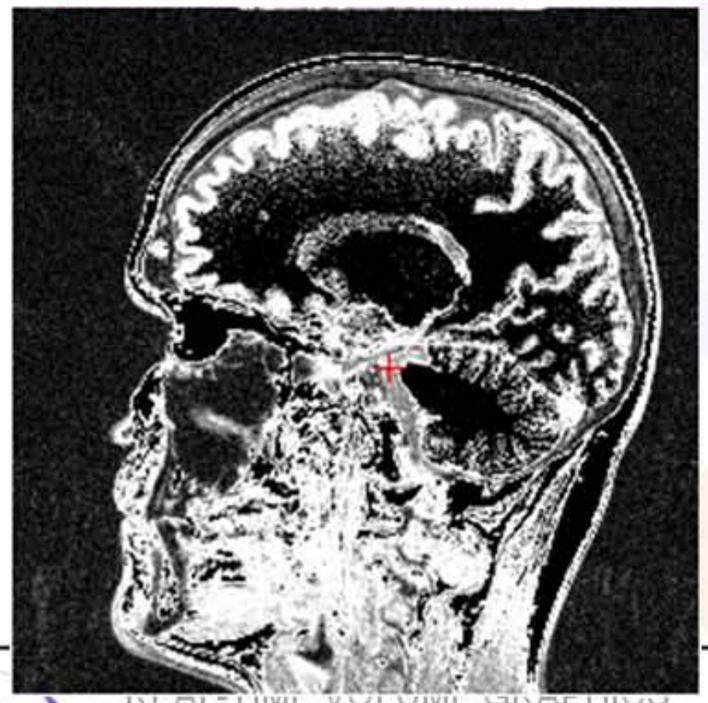


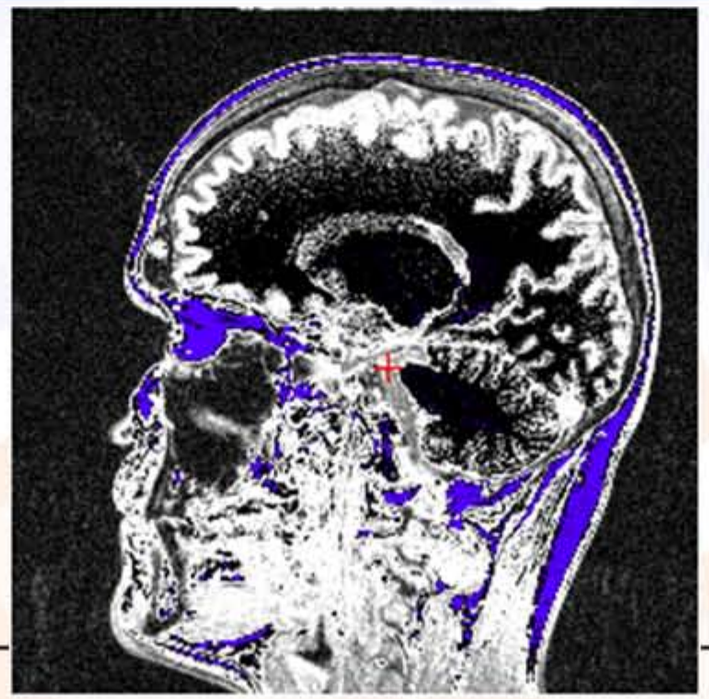


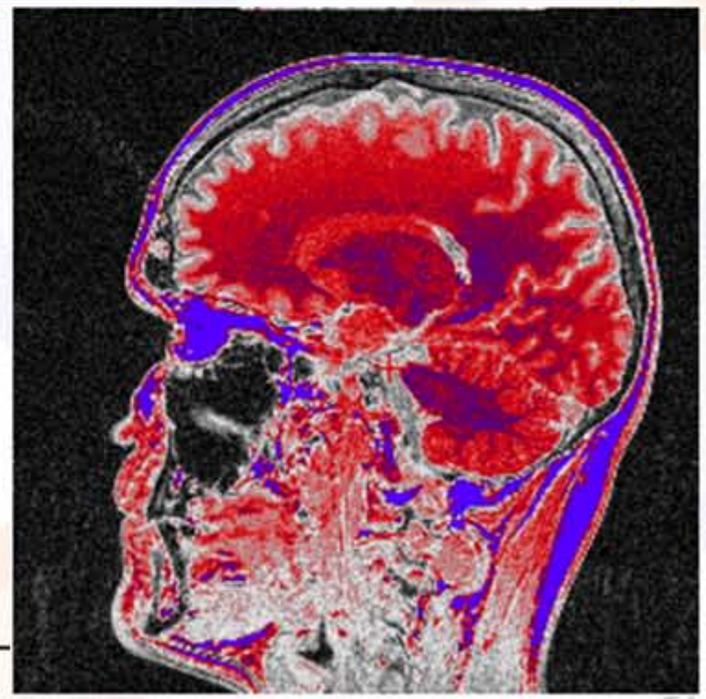
ridges and valleys, plus contours:

Transfer Function Design









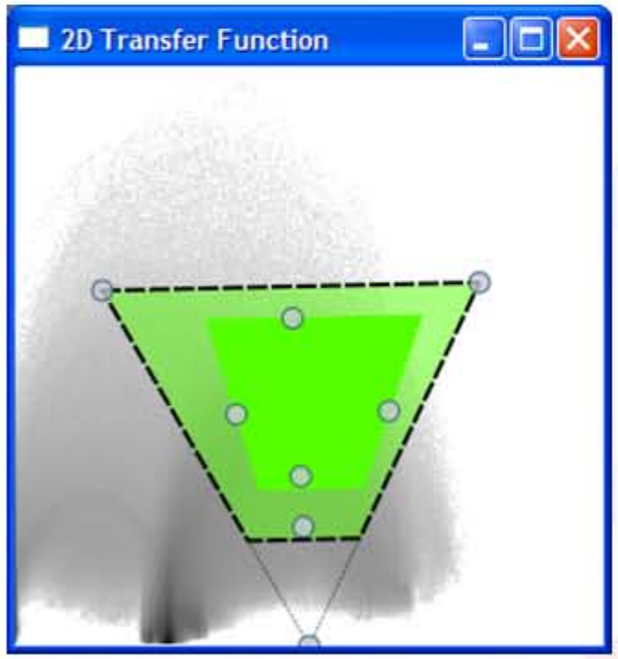
Transfer Function Design

- Editors for 2D Transfer Function Design:

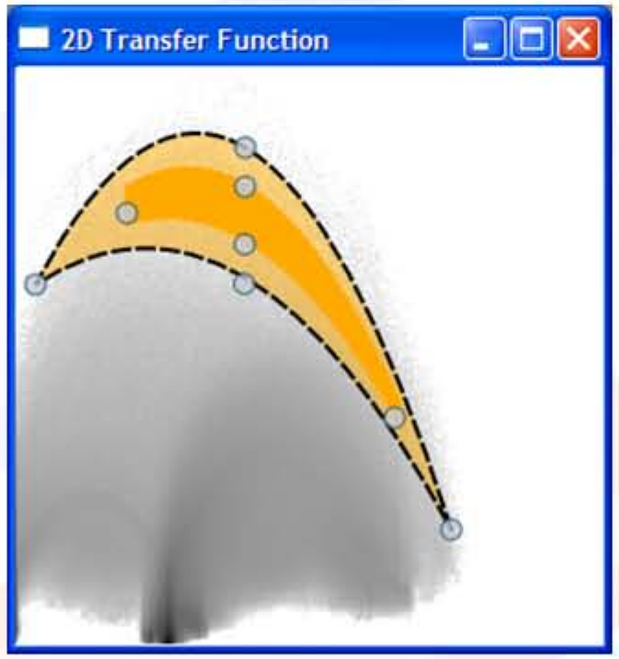
  Editor based on geometric primitives:

  reduce the number of DOFs

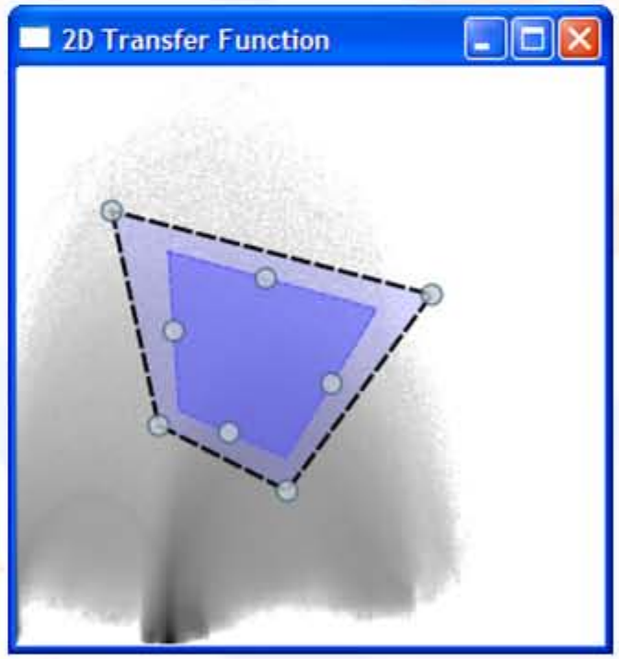
Trapezoids
(Kniss et al. 2001)



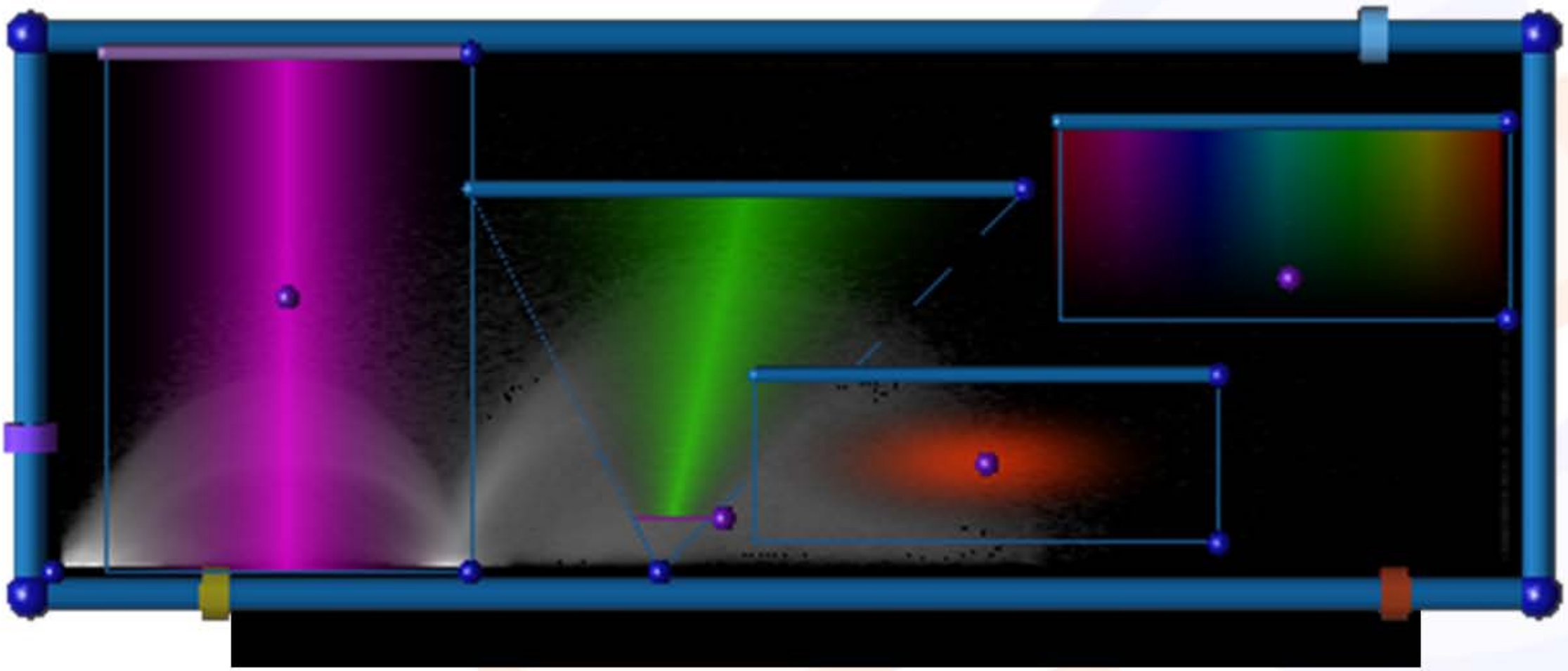
Paraboloids
(Vega et al. 2004)



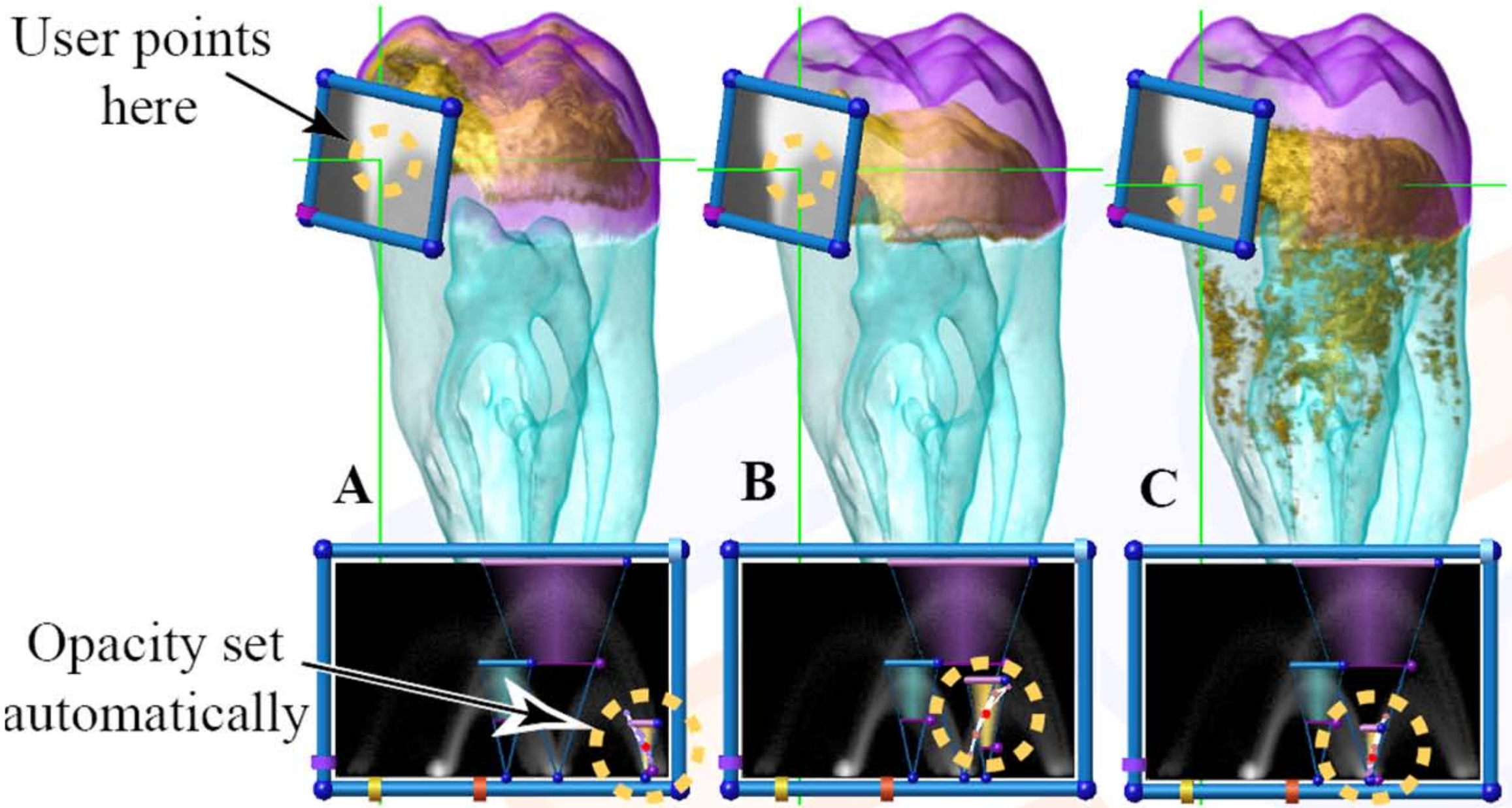
Quadrilaterals



Transfer Function Design



Guidance



Transfer Function Design

Automatic/Semiautomatic Approaches:

- Image-Drive Techniques
  - Interactive Evolution (Genetic Algorithms)
    Design Galleries
  - Inverse Design
    Search for Optimal Setting using Quality Metrics
- Data Driven Techniques
  - Image Processing [Fang et al.]
  - Neural Networks [Tzeng. et al]
  - Position Function [Kindlmann and Durkin]

Conclusion

Multidimensional Transfer Functions

- Scalar Value and Gradient Magnitude
- Coregistered Volume Data/Multivariate Data

- Higher Flexibility and less artifacts
- Assignment becomes difficult!

Transfer Function Design:

- Manual Editing
- Galleries/Thumbnail Selection
- Automatic Techniques