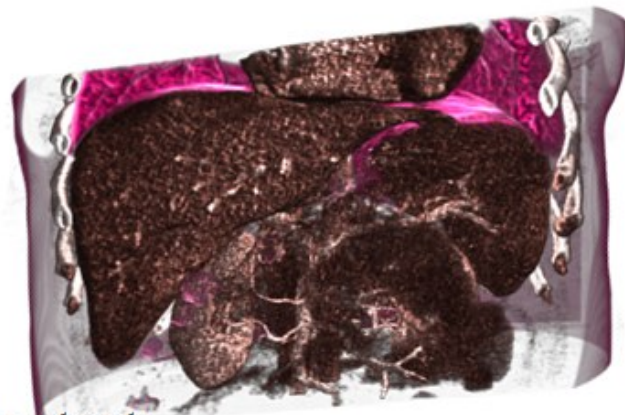
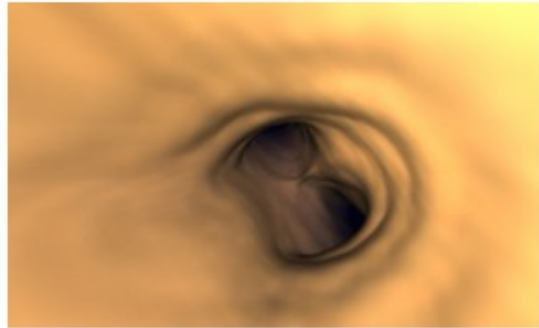


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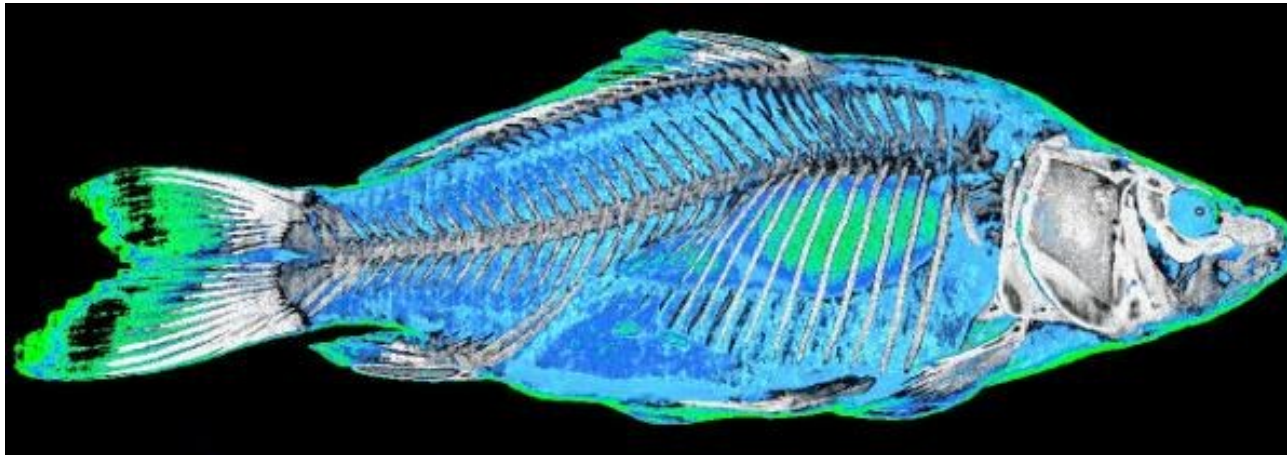
Oliver Kutter – [kutter@cs.tum.edu](mailto:kutter@cs.tum.edu)

Athanasios Karamalis – [karamali@cs.tum.edu](mailto:karamali@cs.tum.edu)

Links to two Videos:

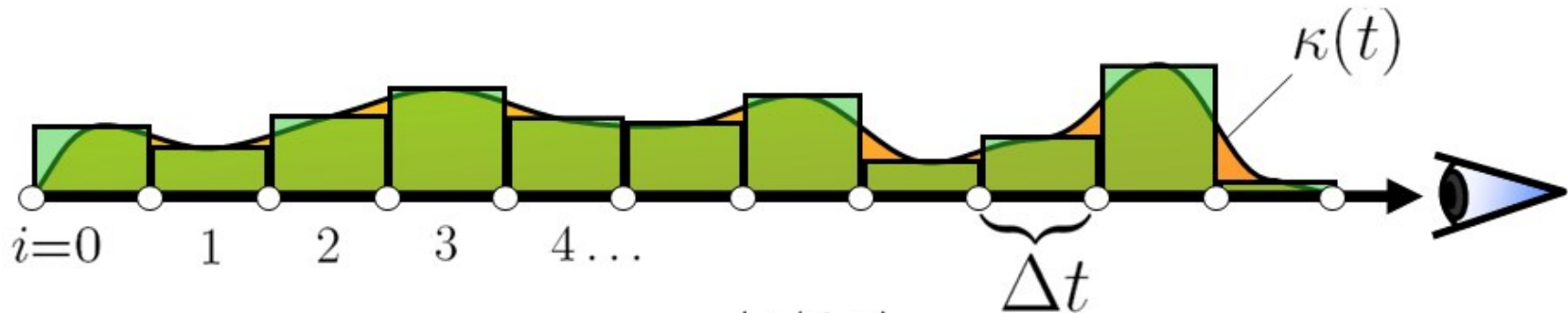
<http://campar.in.tum.de/files/publications/kutter2008amiarcs.video.avi>

<http://campar.in.tum.de/files/publications/kutter2009spie.video1.avi>



As there have been issues with the PDF export of the presentation, find a correction on the next two slides!

## Numerical Solution



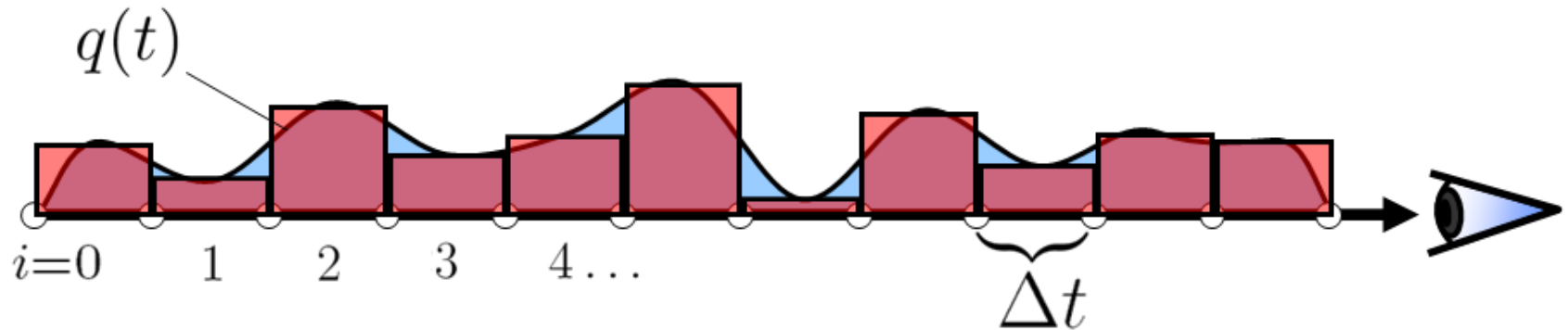
$$\tau(0, t) \approx \tilde{\tau}(0, t) = \sum_{i=0}^{\lfloor t/\Delta t \rfloor} \kappa(i \cdot \Delta t) \Delta t$$

$$e^{-\tilde{\tau}(0, t)} = \prod_{i=0}^{\lfloor t/\Delta t \rfloor} e^{-\kappa(i \cdot \Delta t) \Delta t}$$

Now we introduce opacity:

$$1 - A_i = e^{-\kappa(i \cdot \Delta t) \Delta t}$$

# Numerical Solution



$$\tilde{C} = \sum_{i=0}^{\lfloor T/\Delta t \rfloor} C_i \prod_{j=0}^{i-1} (1 - A_j)$$

can be computed recursively

$$C'_i = C_i + (1 - A_i)C'_{i-1}$$

Radiant energy  
observed at position

Radiant energy  
emitted at position  $i$

Absorption at  
position  $i$

Radiant energy  
observed at position  $i-1$