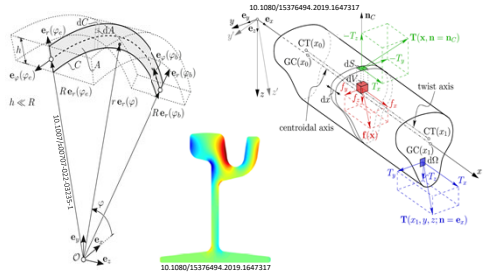
Institut für Mechanik der Werkstoffe und Strukturen

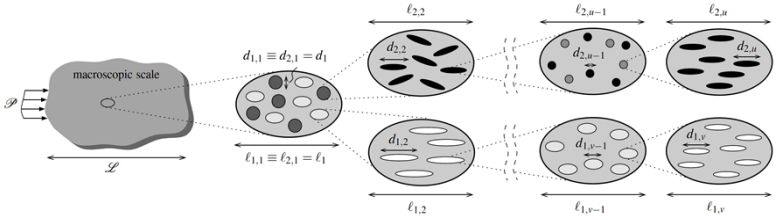
FoB Festigkeitslehre und Biomechanik

SCHWERPUNKTE

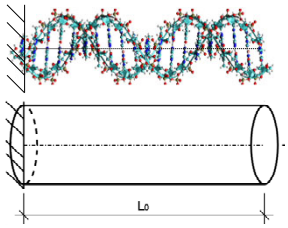
- Analytical and numerical **structural mechanics** concepts



- (Micromechanics-based) **multiscale homogenization** methods, applied to various materials, such as concrete, wood, and bone

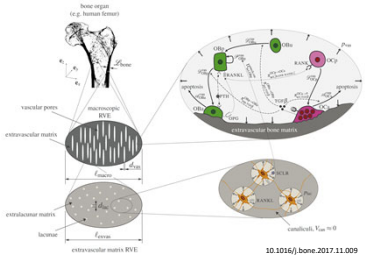


- Development of novel **atom-to-continuum homogenization**



- State-of-the-art **continuum mechanics** concepts
- A wide range of **experimental techniques**, such as nanoindentation, CT imaging, ultrasonics, chemical analyses, and classical mechanical tests
- Utilization of **density functional theory** for creating energy landscapes of graphene
- **Image analysis** for extracting mechanical properties maps, applied to various engineering materials

- Coupling **systems biology** concepts with multiscale mechanics models



FORSCHUNGSPROJEKTE

- Exploration of a natural 3D printing system (2017-2020, funded by the ÖAW)[1]
- Increasing scientific, technological and innovation capacity of Serbia as a widening country in the domain of multiscale modeling and medical informatics in biomedical engineering (2020-2023, funded by the EC, project ID: 952603)[2]
- Multiscale changes in bone due to bioresorbable implants (2020-2023, funded by the FWF)[3]
- Deciphering wood mechanobiology through multiscale modeling (2021-2023, funded by the FWF, project number: TAI388)[4]
- Railways for future: Resilient digital railway systems to enhance performance (2021-2024, funded by the FFG, project ID: COMET882504)[5]
- Engineering of life science doctoral programme (2021-2026, funded by the EC, project ID: 101034277)[6]
- Hereditary mechanics-inspired pandemic modeling (funding request under review)[7]

Relevant references:

[1] Zelaya-Lainez et al. (2021), *JOM* 73: 2390-2402, https://doi.org/10.1007/s11837-021-04702-1
[2] Hellmich et al. (2022), *Appl Mech Rev* 74: 030802, https://doi.org/10.1115/1.4055032
[3] Kurfürst et al. (2018), *Front Phys* 6: 125, https://doi.org/10.3389/fphy.2018.00125
[4] Pastrama et al. (2018), *Bone* 107, 208-221, https://doi.org/10.1016/j.bone.2017.11.009
[5] Scharf et al. (2022), *Acta Mech* 233: 2989-3019, https://doi.org/10.1007/s00707-022-03235-1
[6] Kalliauer et al. (2020), *J Mech Phys Solid* 143: 104040, https://doi.org/10.1016/j.jmps.2020.104040
[7] Ukaj et al. (2021), *Appl Phys Rev* 8: 041417, https://doi.org/10.1063/5.0062867

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