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E|A|S (Evolving Asteroid Starships)

By Nils Faber & Angelo C.J. Vermeulen

The research story

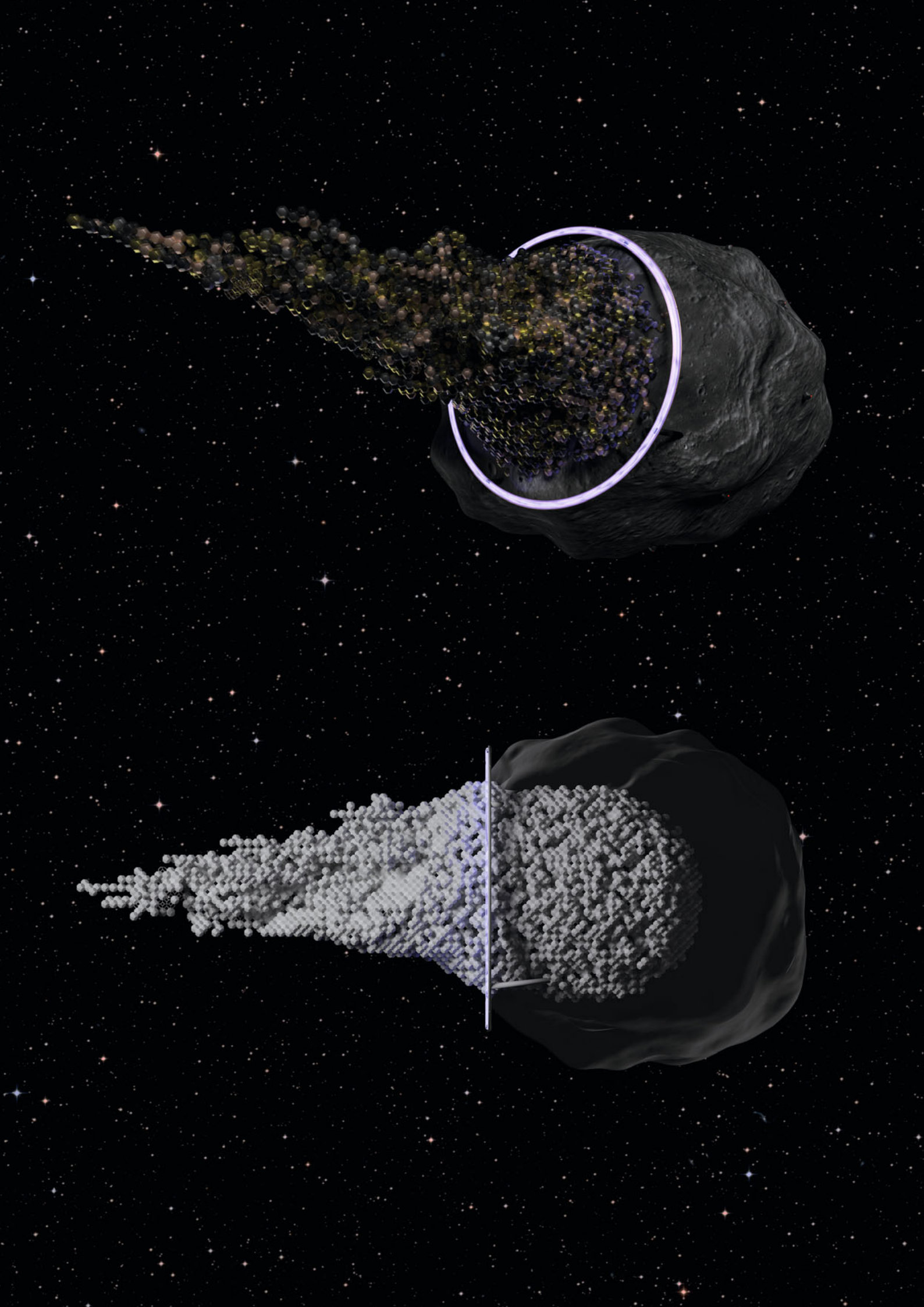
E|A|S (Evolving Asteroid Starships) is a trans-disciplinary research project in which bio-inspired concepts for (manned) interstellar exploration are being developed. A long-duration journey through interstellar space is characterized by a high level of uncertainty [1]. Environmental disturbances such as cosmic radiation surges and particle impact events cannot be predicted in detail for the entire flightpath. A spacecraft with a built-in capacity to grow and evolve during its journey offers a solution to cope with such unforeseen challenges.

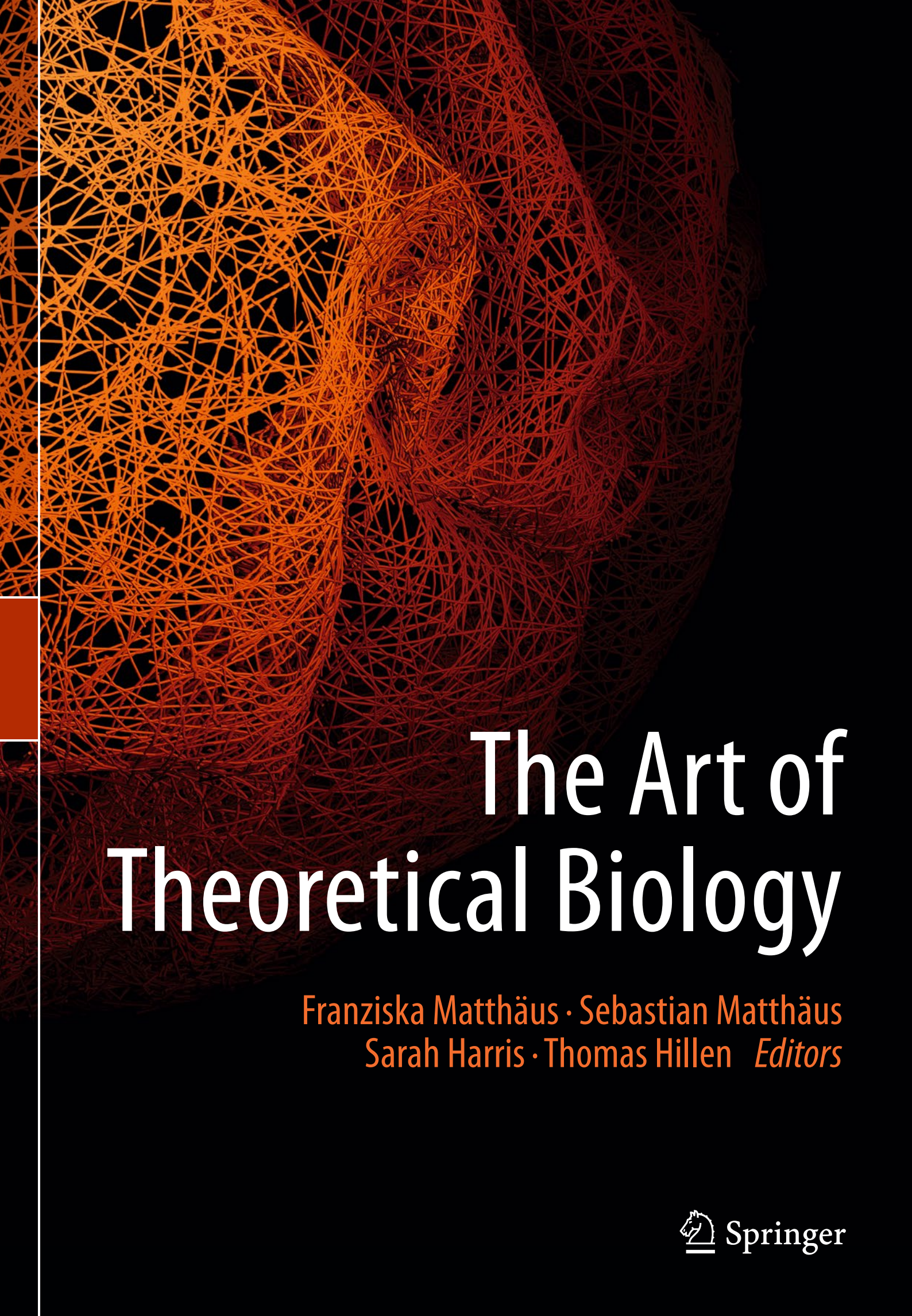
The image

The spacecraft concept shown in this artist's impression relies on asteroid mining and onboard 3D manufacturing. An asteroid is redirected and gradually transformed into a hybrid spacecraft. Asteroid mining provides the resources for ongoing 3D manufacturing of the spacecraft's architecture. Using a morphogenetic engineering approach [2], the spacecraft develops itself gradually, both inside and outside the asteroid. The modular nature of the spacecraft enables structural and functional reconfiguration of its architecture. This allows for an ongoing morphological evolution to adapt and cope with unexpected environmental changes. The E|A|S project focuses on creating a hybrid computer simulation in which this morphogenetic engineering approach to interstellar exploration can be tested. The images are based on two 3D models created in Blender and respectively show an overview of the proposed starship concept and a cutaway view.

References

- [1] Klessen RS, Glover SCO, Physical processes in the interstellar medium, arXiv: 1412.5182v1 [astro-ph.GA].
- [2] Doursat R, Sayama H, Michel O (Eds.), *Morphogenetic Engineering*, Springer, Heidelberg, 2012.





The Art of Theoretical Biology

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Sarah Harris · Thomas Hillen *Editors*

 Springer

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