



Universiteit  
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## **Tuning in to the feedback bassline: revealing the operation of AGNs in galaxy clusters with high-resolution radio observations**

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Propositions accompanying this thesis

## Tuning in to the Feedback Bassline

### Revealing the operation of AGNs in galaxy clusters with high-resolution radio observations

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1. The duty cycle of an AGN results in significant time variability of the observables, which should be accounted for. *(Chapter 2)*
2. Low-frequency radio observations are uniquely valuable to constrain the injection spectrum of a synchrotron spectrum. *(Chapter 3)*
3. The volume occupied by the radio lobes produced by AGNs in the centers of galaxy clusters matches exactly with that of the ICM cavities detected in the X-ray band. *(Chapter 4)*
4. High-resolution Sunyaev-Zel'dovich surveys in the Northern hemisphere are needed to ensure the statistical completeness of galaxy cluster samples used by observatories in this hemisphere. *(Chapter 5)*
5. When pushing the observational frontier of astronomy, contact with the raw data should never be lost.
6. Maintaining an archive of observations is critical for the productivity of any observatory.
7. Most future progress in the field of AGNs is likely to originate from research groups in which cutting-edge observations are combined with dedicated simulations.
8. The rate at which any academic work accumulates comments only asymptotically approaches zero over time.
9. Society, including its universities, exploits the passion scientists have for their research.
10. A significantly larger fraction of resources in academia should systematically be made available for high-risk research.
11. Although good communication in principle is all about how a message is received, the recipient should consider how and why a message was sent.
12. The correct time to start a vrijmibo is 16:00.

Roland Timmerman  
Leiden, 22 November 2023