



Aalborg Universitet

AALBORG UNIVERSITY  
DENMARK

## Multichannel Seismocardiography

*A Novel Method for Investigating the Seismocardiogram*

Munck, Kim; Schmidt, Samuel Emil; Sørensen, Kasper; Struijk, Johannes Jan

*Creative Commons License*  
CC BY 4.0

*Publication date:*  
2018

*Document Version*  
Accepted author manuscript, peer reviewed version

[Link to publication from Aalborg University](#)

*Citation for published version (APA):*

Munck, K., Schmidt, S. E., Sørensen, K., & Struijk, J. J. (2018). *Multichannel Seismocardiography: A Novel Method for Investigating the Seismocardiogram*. Abstract from Computing in Cardiology, CinC 2018, Maastricht, Netherlands.

### General rights

Copyright and moral rights for the publications made accessible in the public portal are retained by the authors and/or other copyright owners and it is a condition of accessing publications that users recognise and abide by the legal requirements associated with these rights.

- ? Users may download and print one copy of any publication from the public portal for the purpose of private study or research.
- ? You may not further distribute the material or use it for any profit-making activity or commercial gain
- ? You may freely distribute the URL identifying the publication in the public portal ?

### Take down policy

If you believe that this document breaches copyright please contact us at [vbn@aub.aau.dk](mailto:vbn@aub.aau.dk) providing details, and we will remove access to the work immediately and investigate your claim.

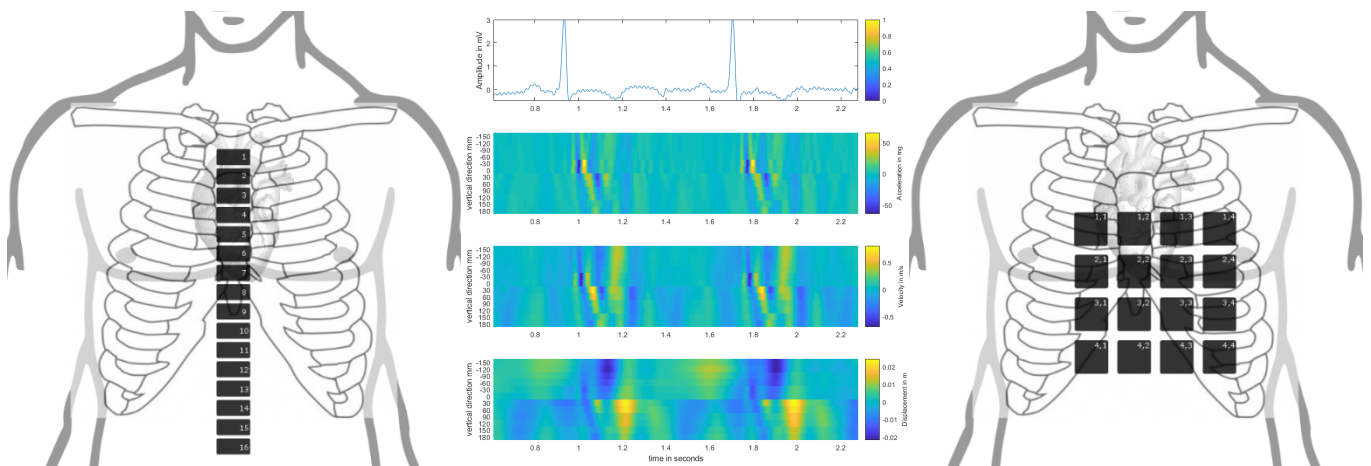
## Multichannel seismocardiography: A novel method for investigating the seismocardiogram

*Kim Munck, Kasper Sørensen, Johannes Struijk, and Samuel Schmidt*

Seismocardiography (SCG) have long been proposed as the mechanical counterpart of electrocardiography. However, while the different components of the electrocardiography have been accounted for the SCG seems more complex. Methods that included echocardiography have been used to study the relation between the heart activity and the SCG components. However SCG seems to be a composition of many waves that propagates across the chest, and then is acquired at a single site.

We hypothesis that by investigating chest vibrations synchronously from multiple sites we can investigate how waves propagates across the chest. By comparing the waves propagation velocity, direction, epicenters, and timing, we hope to better explain how the SCG from a single site is composed of these waves.

A system with up to 16 3-axis highly sensitive accelerometers where developed. This multichannel seismocardiogram (mSCG) could synchronize the measurements of 16 SCG along with a 3-lead ECG. To investigate the chest waves two sensor formations have been proposed. The transverse formation reveals a distinct wave that travels downward from the xiphoid process. The second formation is in a 4 by 4 grid on the chest, which show that the local maximum of the SCG different waves have different centers.



We have shown through this method that information about the composition of a single site SCG can be better explained by measuring on multiple sites and by investigating the features of the individual waves. Further studies with this method will be conducted, that will involve echocardiography, to assist in describing the SCG signal composition of chest surface waves.