

## Exposé court

### 43 **Multidimensional Integer Trigonometry**

Dolan, James G. (University of Liverpool)

In this talk I will provide an introduction into multidimensional integer trigonometry as outlined in our recently published paper [1]. We start with an exposition of integer trigonometry in two dimensions, which was introduced in 2008, and use this to generalise these integer trigonometric functions to arbitrary dimension. We then move on to study the basic properties of integer trigonometric functions. We find integer trigonometric relations for transpose and adjacent simplicial cones, and for the cones which generate the same simplices. Additionally, we discuss the relationship between integer trigonometry, the Euclidean algorithm, and continued fractions. Finally, we use adjacent and transpose cones to introduce a notion of best approximations of simplicial cones. In two dimensions, this notion of best approximation coincides with the classical notion of the best approximations of real numbers.

For further reading on integer trigonometry see [2].

### **Bibliography**

- [1] J. Blackman, J. Dolan, and O. Karpenkov. Multidimensional integer trigonometry, 2023, arXiv:2302.02720.
- [2] O. N. Karpenkov. Geometric continued fractions. In *Geometry of Continued Fractions*, pages 87–96. Springer, 2022.