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## **Multilinear maps and polynomials on complex vector lattices**

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Given a real vector space  $V$ , its complexification is  $V_{\mathbb{C}} := V \oplus iV$ . If  $U \otimes V$  is the algebraic tensor product of real vector spaces  $U$  and  $V$  then  $(U \otimes V)_{\mathbb{C}}$  is the algebraic tensor product of  $U_{\mathbb{C}}$  and  $V_{\mathbb{C}}$ . However, we show that if  $E$  and  $F$  are Archimedean and uniformly complete vector lattices with Fremlin tensor product  $E \overline{\otimes} F$  then  $(E \overline{\otimes} F)_{\mathbb{C}}$  often fails to be a vector lattice tensor product of  $E_{\mathbb{C}}$  and  $F_{\mathbb{C}}$ . We introduce a tensor product for Archimedean complex vector lattices that is suitable for the study of multilinear maps and orthogonally additive polynomials on complex vector lattices. New complex vector lattices of linear, multilinear, and orthogonally additive maps are also introduced.

**Joint work with Gerard Buskes.**