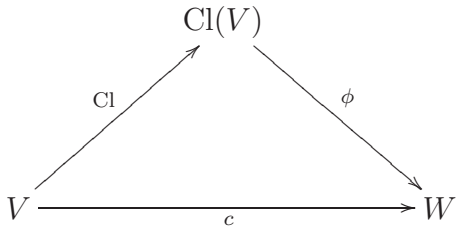
0.1 A Non–Commutative Quantum Observable Algebra is a Clifford Algebra

Definition 0.1. Let us briefly define the notion of a *Clifford algebra*. Thus, let us consider first a pair (V, Q), where V denotes a real vector space and Q is a quadratic form on V . Then, the *Clifford algebra associated to* V, is denoted here as $\mathrm{Cl}(V) = \mathrm{Cl}(V, Q)$, is the *algebra over* $\mathbb{R}$ *generated by* V, where for all $v, w \in V$, the relations: $v \cdot w + w \cdot v = -2Q(v, w)$, are satisfied; in particular, $v^2 = -2Q(v, v)$.

If W is an algebra and $c : V \longrightarrow W$ is a linear map satisfying $c(w)c(v)+c(v)c(w) = -2Q(v, w)$, then there exists a unique algebra homomorphism $\phi : \mathrm{Cl}(V) \longrightarrow W$ such that the diagram



commutes. (It is in this sense that $\mathrm{Cl}(V)$ is considered to be 'universal').