

Re: tensorial question

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Edward Green wrote:

- > *The space of all linear functions on a vector space forms a second*
- > *vector space, known as a dual space. An example of a vector space and*
- > *its dual is given by the space of Kets and Bras in any quantum*
- > *mechanical set-up.*
- >
- > *To what extent do the spaces of covariant and contravariant vectors at*
- > *any point on a manifold enjoy this relation?*

It's a while ago that I learned differential geometry, but aren't the covariant vectors *defined* to be the linear functions of the contravariant vectors? (or was it the other way round?)

- > *Some possible similarities:*
- >
- > *We can form inner products between one from column A, one from column*
- > *B.*
- >
- > *Some possible dissimilarities:*
- >
- > *To form the inner products in the second case, we need the help of the*
- > *metric.*

Well, inner products aren't limited to the standard scalar product. I don't think that the fact that one has to use the metric here is a big problem.

- > *(As if we always had to stick and operator inside the Bra and Ket)*

Or as if we had defined the scalar product of Bra and Ket in a slightly different way.

- > *We can interconvert between types, again with help of the metric.*
- >
- > *(Though we can do something similar in QM, since we implicitly know*
- > *how to make a Bra from a Ket?)*

Again, good point...

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- > *We can have objects with an indefinite number of each type of "index",*
- > *not just vectors.*

In QM, it is also possible to construct tensors, e.g. by using a tensor product of the state vectors.

- > *(Could we extend the parallel, say, by learning how to write operators*
- > *in "Bra,Bra" form, which would act on a pair of Kets, for example?)*

Such things indeed exist. Think e.g. of the direct product of two spinors.

- > *I'm just groping towards grokking, which often excites griping,*
- > *particularly among those with personality disorders, mollusc fetishes*
- > *and francophone names.*

Good luck. ;-)

Bye,
Bjoern