PROFESSOR: I now want to discuss the subtraction of vectors.

If we have the same vectors A and B and C now equals A minus B, then it should not come as a surprise that A minus B equals Ax minus Bx in the x-direction plus Ay minus B of y in the y-direction plus A of z minus B of z in the z-direction. So this is the x-component of the vector C, this is the y-component, and this is the z-component of the vector C.

We can also see that in a geometrical way, to get some feeling for it, what it means to subtract vectors. And again, I will take a two-dimensional case. It's easier to see. And for simplicity, I will take the vectors only in the y- and the x-plane. But what I do holds in general, also in three dimensions.

So we have now here the y-axis, and we have the plus x-axis, the origin plus y-axis. Let this vector be A and let this vector be B. And we want to know what the vector C is, which is A minus B.

Now I can construct a parallelogram by drawing this line from B to A. Draw a parallel line through the tail of B. Draw a parallel line through the tip of A parallel to B. And where these two intersect, this is now my vector C, which is A minus B.

You can easily see this in a different way. You can see that this is, indeed, correct. I can think of this subtraction as the following: C plus B equals A. So the question now is, which vector do I have to add to B, namely, the vector C, to get A?

Well, you see immediately that if I add this vector to this vector, following the rules of the adding of vectors making a parallelogram, that this vector A is the sum of B and C. That's one way of doing it.

Another way of doing it is saying, ah-ha! C is also A plus minus B. So minus B is this vector, it's the same as this one, but 180 degrees flipped over. Now I have to add this vector to A to find C. Well, there we go. I make a parallelogram. There we go. And where do I end up? Right here. So notice that the sum of this vector and this vector according to the summation rules indeed gives me this vector. And so this is a nice way of sort of seeing in your head geometrically what it means when you subtract vectors.