Classical Fields in Special Relativity CHRIS VUILLE, Embry-Riddle
Aeronautical University — Classical field equations are ordinarily postulated, im-
posed on a background space-time. Here it is shown that in relativity such fields
can be a natural consequence of the underlying space-time structure; they need not
and can not be arbitrarily defined. Indeed, under general assumptions, a classical
field that results in a four-acceleration on flat space-time must satisfy Maxwell's
equations. The field can also be a solution of a Proca equation, if it is assumed, in
addition, to be derived from a vector potential with zero divergence. Some analogous
result may be possible for quantum fields, given the proper underlying spacetime
structure.

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