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Fix a prime number  $\ell$  and a number field  $k$ , and consider abelian varieties whose  $\ell$ -power torsion generates a pro- $\ell$  extension of  $k(\mu_{\ell^\infty})$  which is unramified away from  $\ell$ . It is a necessary, but not generally sufficient, condition that such varieties have good reduction away from  $\ell$ .

In the special case of  $\ell = 2$ , we demonstrate that for abelian surfaces over  $\mathbf{Q}$ , good reduction away from  $\ell$  does suffice. The result is extended to elliptic curves and abelian surfaces over certain number fields of low degree. We conclude with an explicit example to demonstrate that good reduction is not sufficient, at  $\ell = 2$ , for abelian varieties of sufficiently high dimension. (Received January 18, 2016)