The Liénard–Wiechert potentials of the collection of particles are given by

$$\Phi(\mathbf{x},t)=\sum_j\left[\frac{q}{\kappa_j(t)R_j(t)}\right]_{\text{ret}} \qquad \mathbf{A}(\mathbf{x},t)=\sum_j\left[\frac{q\boldsymbol{\beta}_j(t)}{\kappa_j(t)R_j(t)}\right]_{\text{ret}} \tag{1}$$

where

$$\kappa_j(t)=1-\mathbf{n}_j(t)\cdot\boldsymbol{\beta}_j(t) \qquad R_j(t)=\left|\mathbf{x}-\mathbf{r}_j(t)\right| \qquad \mathbf{n}_j(t)=\frac{\mathbf{x}-\mathbf{r}_j(t)}{\left|\mathbf{x}-\mathbf{r}_j(t)\right|} \tag{2}$$

and the evaluation is at the retarded time t_{ret} defined by

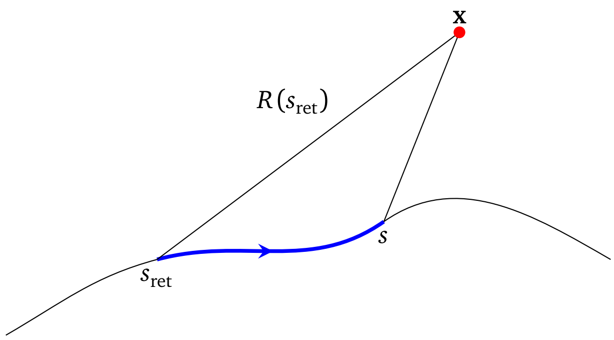
$$t-t_{\text{ret}}=\frac{R_j(t_{\text{ret}})}{c} \tag{3}$$

In the continuum limit specified by the problem, the potentials can be written in integral form with regard to the length parameter s along the path

$$\Phi(\mathbf{x},t)=\oint_L\left[\frac{\lambda ds}{\kappa(s)R(s)}\right]_{\text{ret}} \qquad \mathbf{A}(\mathbf{x},t)=\oint_L\left[\frac{\lambda\boldsymbol{\beta}(s)\,ds}{\kappa(s)R(s)}\right]_{\text{ret}}=\oint\left[\frac{\lambda v d\mathbf{s}}{c\kappa(s)R(s)}\right]_{\text{ret}} \tag{4}$$

where the retarded time evaluation is substituted by the "retarded length parameter" evaluation, defined by

$$\frac{s-s_{\text{ret}}}{v}=\frac{R(s_{\text{ret}})}{c} \tag{5}$$



We can already see that the RHS of $\Phi(\mathbf{x},t)$ and $\mathbf{A}(\mathbf{x},t)$ are independent of time. This is possible because of the continuum limit where the time dependence of the integrand is converted to the dependency of the length parameter s. We have static fields at any observation point $\mathbf{x}$.

Differentiating both sides of (5) with respect to s_{ret} gives

$$\begin{aligned}\frac{1}{v}\left(\frac{ds}{ds_{\text{ret}}}-1\right)=\frac{1}{c}\frac{dR(s_{\text{ret}})}{ds_{\text{ret}}}=\frac{1}{c}\frac{d\left|\mathbf{x}-\mathbf{r}(s_{\text{ret}})\right|}{ds_{\text{ret}}}=-\frac{1}{c}\mathbf{n}(s_{\text{ret}})\cdot\frac{d\mathbf{r}}{ds_{\text{ret}}} \qquad \Longrightarrow \\ ds=\left[1-\mathbf{n}(s_{\text{ret}})\cdot\boldsymbol{\beta}(s_{\text{ret}})\right]ds_{\text{ret}}=\kappa(s_{\text{ret}})\,ds_{\text{ret}}\end{aligned} \tag{6}$$

This allows us to write the potentials as integrals with respect to the retarded length parameter s_{ret}

$$\Phi(x)=\oint_L\frac{\lambda ds_{\text{ret}}}{R(s_{\text{ret}})} \qquad \mathbf{A}(x)=\frac{1}{c}\oint_L\frac{\lambda v d\mathbf{s}_{\text{ret}}}{R(s_{\text{ret}})} \tag{7}$$

which are exactly the static Coulomb and Biot–Savart potentials if we treat the dummy variable s_{ret} as regular length parameter s.

Since static Coulomb and Biot-Savart fields decay as $1/R^2$, there is no radiation which requires $1/R$ decay.