

## The PC prior for the correlation $\rho$ with $\rho = 1$ as the base-model

### Parametrization

This prior is the PC prior for the correlation  $\rho$  where  $\rho = 1$  is the base-model. The density for  $\rho$  is

$$\pi(\rho) = \frac{\lambda \exp(-\lambda \mu(\rho))}{1 - \exp(-\sqrt{2}\lambda)} J(\rho)$$

where

$$\mu(\rho) = \sqrt{1 - \rho}$$

and

$$J(\rho) = \frac{1}{2\mu(\rho)}$$

The parameter  $\lambda$  is defined through

$$\text{Prob}(\rho > u) = \alpha, \quad -1 < u < 1, \quad \sqrt{\frac{1-u}{2}} < \alpha < 1$$

where  $(u, \alpha)$  are the parameters to this prior. The solution is implicate

$$\frac{\exp(-\lambda \sqrt{1-u})}{1 - \exp(-\sqrt{2}\lambda)} = \alpha$$

which explains why we have

$$\alpha > \mu(u)/\sqrt{2} = \sqrt{\frac{1-u}{2}}$$

for a solution to exists with  $\lambda > 0$ . So for  $u = 1/2$  then  $\alpha > 1/2$ .

### Specification

This prior for the hyperparameters is specified inside the **hyper**-spesification, as

```
hyper = list(<theta> = list(prior="pc.cor1", param=c(<u>,<alpha>))))
```

### Example

### Notes

See also functions `inla.pc.{d,p,q,r}rho1`