B. Carneiro da Cunha

- $y'' + py' + qy = 0$ Fuchsian 2nd order

$$p(z) = \frac{1-\theta_0}{z} + \frac{1-\vartheta_1}{z-1} + \sum_i \frac{1-\vartheta_i}{z-z_i}$$

$$q(z) = \frac{K}{z(z-1)} + \sum_k \frac{K_k}{z(z-1)(z-z_k)}$$

by fixing using conf. tr 3 of the singularities to $z = 0, 1, \infty$.

- related to flat holomorphic conn's

$$\frac{d}{dz}\begin{pmatrix} y \\ y' \end{pmatrix} = \begin{pmatrix} 0 & 1 \\ -q(z) & p(z) \end{pmatrix}\begin{pmatrix} y \\ y' \end{pmatrix} \qquad (*)$$

- given sol'n $\Phi(z)$, define $A(z) = (\partial_z \Phi)\Phi^{-1}$

- given such $A(z)$, we can reconstruct $p(z), q(z)$ (an "oper"), but generically we get more singularities than in (*) if $A_{12} \neq$ constant ;

- flat conn's $\Rightarrow$ observables are holonomies

$$M_i = P\exp \oint_{z_i} A(z)\, dz$$

and $\operatorname{Tr} M_i = 2\cos\pi\vartheta_i$, $\operatorname{Tr} M_i M_j = 2\cos\pi\sigma_{ij}$