

Now Let's Add an Observer

$$A = \begin{pmatrix} 0 & 0 & \dots & 0 & -a_n \\ 0 & 1 & \dots & 0 & -a_{n-1} \\ \vdots & \vdots & \ddots & \vdots & \vdots \\ 0 & 0 & \dots & 0 & -a_2 \\ 0 & 0 & \dots & 1 & -a_1 \end{pmatrix}$$

$$LC = \begin{pmatrix} \ell_1 \\ \ell_2 \\ \vdots \\ \ell_n \end{pmatrix} (0 \ 0 \ \dots \ 1) = \begin{pmatrix} 0 & 0 & \dots & 0 & \ell_1 \\ 0 & 0 & \dots & 0 & \ell_2 \\ \vdots & \vdots & \ddots & \vdots & \vdots \\ 0 & 0 & \dots & 0 & \ell_{n-1} \\ 0 & 0 & \dots & 0 & \ell_n \end{pmatrix}$$

$$A - LC = \begin{pmatrix} 0 & 0 & \dots & 0 & -(a_n + \ell_1) \\ 0 & 1 & \dots & 0 & -(a_{n-1} + \ell_2) \\ \vdots & \vdots & \ddots & \vdots & \vdots \\ 0 & 0 & \dots & 0 & -(a_2 + \ell_{n-1}) \\ 0 & 0 & \dots & 1 & -(a_1 + \ell_n) \end{pmatrix}$$

— still in OCF!!