Step	Algorithm: $[C] := \text{SYRK_LT_UNB_VAR2}(A, C)$
1a	${C = \widehat{C}}$
4	$C \to \begin{pmatrix} C_{TL} & C_{TR} \\ C_{BL} & C_{BR} \end{pmatrix}, A \to \begin{pmatrix} A_L & A_R \end{pmatrix}$ where C_{BR} is 0×0 , A_R has 0 columns
2	$\left\{ \left(\begin{array}{c c} C_{TL} & C_{TR} \\ \hline C_{BL} & C_{BR} \end{array} \right) = \left(\begin{array}{c c} \widehat{C}_{TL} & \widehat{C}_{TR} \\ \hline \widehat{C}_{BL} & A_R^T A_R + \widehat{C}_{BR} \end{array} \right)$
3	while $m(C_{BR}) < m(C)$ do
2,3	$\left\{ \begin{array}{c c} C_{TL} & C_{TR} \\ \hline C_{BL} & C_{BR} \end{array} \right) = \left(\begin{array}{c c} \widehat{C}_{TL} & \widehat{C}_{TR} \\ \hline \widehat{C}_{BL} & A_R^T A_R + \widehat{C}_{BR} \end{array} \right) \wedge m(C_{BR}) < m(C) $
5a	$ \left(\begin{array}{c c c} C_{TL} & C_{TR} \\ \hline C_{BL} & C_{BR} \end{array}\right) \rightarrow \left(\begin{array}{c c} C_{00} & c_{01} & C_{02} \\ \hline c_{10}^T & \gamma_{11} & c_{12}^T \\ \hline C_{20} & c_{21} & C_{22} \end{array}\right), \left(\begin{array}{c c} A_L & A_R \end{array}\right) \rightarrow \left(\begin{array}{c c} A_0 & a_1 & A_2 \end{array}\right) $ where γ_{11} is 1×1 , a_1 has 1 column
6	$ \left\{ \begin{array}{c c} C_{00} & c_{01} & C_{02} \\ \hline c_{10}^T & \gamma_{11} & c_{12}^T \\ \hline C_{20} & c_{21} & C_{22} \end{array} \right\} = \left(\begin{array}{c c} \widehat{C}_{00} & \widehat{c}_{01} & \widehat{C}_{02} \\ \widehat{c}_{10}^T & \widehat{\gamma}_{11} & \widehat{c}_{12}^T \\ \hline \widehat{C}_{20} & \widehat{c}_{21} & A_2^T A_2 + \widehat{C}_{22} \end{array} \right) $
8	$ \gamma_{11} := a_1^T a_1 + \gamma_{11} c_{21} := A_2^T a_1 + c_{21} $
7	$ \left\{ \begin{array}{c cc} C_{00} & c_{01} & C_{02} \\ \hline c_{10}^T & \gamma_{11} & c_{12}^T \\ C_{20} & c_{21} & C_{22} \end{array} \right) = \left(\begin{array}{c cc} C_{00} & c_{01} & C_{02} \\ \hline c_{10}^T & a_1^T a_1 + \widehat{\gamma}_{11} & a_1^T A_2 + \widehat{c}_{21}^T \\ C_{20} & A_2^T a_1 + \widehat{c}_{21} & A_2^T A_2 + \widehat{C}_{22} \end{array} \right) $
5b	$ \left(\begin{array}{c c c} C_{TL} & C_{TR} \\ \hline C_{BL} & C_{BR} \end{array}\right) \leftarrow \left(\begin{array}{c c c} C_{00} & c_{01} & C_{02} \\ \hline c_{10}^T & \gamma_{11} & c_{12}^T \\ C_{20} & c_{21} & C_{22} \end{array}\right), \left(\begin{array}{c c c} A_L & A_R \end{array}\right) \leftarrow \left(\begin{array}{c c c} A_0 & a_1 & A_2 \end{array}\right) $
2	$\left\{ \begin{array}{c c} C_{TL} & C_{TR} \\ \hline C_{BL} & C_{BR} \end{array} \right) = \left(\begin{array}{c c} \widehat{C}_{TL} & \widehat{C}_{TR} \\ \hline \widehat{C}_{BL} & A_R^T A_R + \widehat{C}_{BR} \end{array} \right)$
	endwhile
2,3	$\left\{ \left(\begin{array}{c c} C_{TL} & C_{TR} \\ \hline C_{BL} & C_{BR} \end{array} \right) = \left(\begin{array}{c c} \widehat{C}_{TL} & \widehat{C}_{TR} \\ \hline \widehat{C}_{BL} & A_R^T A_R + \widehat{C}_{BR} \end{array} \right) \land \neg (m(C_{BR}) < m(C)) \right\}$
1b	$\{C = A^T A + \widehat{C} $

Step	Algorithm: $[C] := \text{SYRK_LT_UNB_VAR2}(A, C)$	
1a	{	}
4	where	
2		
3	while do	
2,3		
5a	where	
6		
8		
7		
5b		
2		
	endwhile	
2,3	$\bigg\{ \hspace{1cm} \wedge \neg (\hspace{1cm})$	
1b	{	}

Step	Algorithm: $[C] := \text{SYRK_LT_UNB_VAR2}(A, C)$	
1a	$\{C=\widehat{C}$	}
4		
	where	7
2		$\left. ight\}$
3	while do	
2,3		$\left. ight\}$
5a	where	
6		$\left.\begin{array}{c} \\ \end{array}\right\}$
8		
7		$\left. \right $
5b		
2		$igg\}$
	endwhile	
2,3		$igg\}$
1b	$\{C = A^T A + \widehat{C}$	}

Step	Algorithm: $[C] := \text{SYRK_LT_UNB_VAR2}(A, C)$
1a	$\{C = \widehat{C}$
4	where
2	$\left\{ \begin{pmatrix} C_{TL} & C_{TR} \\ C_{BL} & C_{BR} \end{pmatrix} = \begin{pmatrix} \widehat{C}_{TL} & \widehat{C}_{TR} \\ \widehat{C}_{BL} & A_R^T A_R + \widehat{C}_{BR} \end{pmatrix} \right\}$
3	while do
2,3	$\left\{ \begin{array}{c c} C_{TL} & C_{TR} \\ \hline C_{BL} & C_{BR} \end{array} \right) = \left(\begin{array}{c c} \widehat{C}_{TL} & \widehat{C}_{TR} \\ \hline \widehat{C}_{BL} & A_R^T A_R + \widehat{C}_{BR} \end{array} \right) \wedge \right.$
5a	where
6	
8	
7	
5b	
2	$\left\{ \begin{array}{c c} C_{TL} & C_{TR} \\ \hline C_{BL} & C_{BR} \end{array} \right) = \left(\begin{array}{c c} \widehat{C}_{TL} & \widehat{C}_{TR} \\ \hline \widehat{C}_{BL} & A_R^T A_R + \widehat{C}_{BR} \end{array} \right)$
	endwhile
2,3	$ \left\{ \left(\begin{array}{c c} C_{TL} & C_{TR} \\ \hline C_{BL} & C_{BR} \end{array} \right) = \left(\begin{array}{c c} \widehat{C}_{TL} & \widehat{C}_{TR} \\ \hline \widehat{C}_{BL} & A_R^T A_R + \widehat{C}_{BR} \end{array} \right) \land \neg () $
1b	$\left\{ C = A^T A + \widehat{C} \right\}$

Step	Algorithm: $[C] := \text{SYRK_LT_UNB_VAR2}(A, C)$
1a	$\{C = \widehat{C}$
4	where
2	$ \left\{ \left(\begin{array}{c c} C_{TL} & C_{TR} \\ \hline C_{BL} & C_{BR} \end{array} \right) = \left(\begin{array}{c c} \widehat{C}_{TL} & \widehat{C}_{TR} \\ \hline \widehat{C}_{BL} & A_R^T A_R + \widehat{C}_{BR} \end{array} \right) $
3	while $m(C_{BR}) < m(C)$ do
2,3	$\left\{ \begin{array}{c c} \left(\begin{array}{c c} C_{TL} & C_{TR} \\ \hline C_{BL} & C_{BR} \end{array} \right) = \left(\begin{array}{c c} \widehat{C}_{TL} & \widehat{C}_{TR} \\ \hline \widehat{C}_{BL} & A_R^T A_R + \widehat{C}_{BR} \end{array} \right) \wedge m(C_{BR}) < m(C) \end{array} \right\}$
5a	where
6	
8	
7	
5b	
2	$ \left\{ \begin{array}{c c} C_{TL} & C_{TR} \\ \hline C_{BL} & C_{BR} \end{array} \right) = \left(\begin{array}{c c} \widehat{C}_{TL} & \widehat{C}_{TR} \\ \hline \widehat{C}_{BL} & A_R^T A_R + \widehat{C}_{BR} \end{array} \right) $
	endwhile
2,3	$\left\{ \left(\begin{array}{c c} C_{TL} & C_{TR} \\ \hline C_{BL} & C_{BR} \end{array} \right) = \left(\begin{array}{c c} \widehat{C}_{TL} & \widehat{C}_{TR} \\ \hline \widehat{C}_{BL} & A_R^T A_R + \widehat{C}_{BR} \end{array} \right) \land \neg (m(C_{BR}) < m(C)) \right\}$
1b	$\{C = A^T A + \widehat{C} $

Step	Algorithm: $[C] := \text{SYRK_LT_UNB_VAR2}(A, C)$
1a	${C = \widehat{C}}$
4	$C \to \left(\begin{array}{c c} C_{TL} & C_{TR} \\ \hline C_{BL} & C_{BR} \end{array}\right), A \to \left(\begin{array}{c c} A_L & A_R \end{array}\right)$ where C_{BR} is 0×0 , A_R has 0 columns
2	$\left\{ \left(\begin{array}{c c} C_{TL} & C_{TR} \\ \hline C_{BL} & C_{BR} \end{array} \right) = \left(\begin{array}{c c} \widehat{C}_{TL} & \widehat{C}_{TR} \\ \hline \widehat{C}_{BL} & A_R^T A_R + \widehat{C}_{BR} \end{array} \right)$
3	while $m(C_{BR}) < m(C)$ do
2,3	$\left\{ \begin{array}{c c} C_{TL} & C_{TR} \\ \hline C_{BL} & C_{BR} \end{array} \right) = \left(\begin{array}{c c} \widehat{C}_{TL} & \widehat{C}_{TR} \\ \hline \widehat{C}_{BL} & A_R^T A_R + \widehat{C}_{BR} \end{array} \right) \wedge m(C_{BR}) < m(C) $
5a	where
6	
8	
7	
5b	
2	$\left\{ \begin{array}{c c} C_{TL} & C_{TR} \\ \hline C_{BL} & C_{BR} \end{array} \right) = \left(\begin{array}{c c} \widehat{C}_{TL} & \widehat{C}_{TR} \\ \hline \widehat{C}_{BL} & A_R^T A_R + \widehat{C}_{BR} \end{array} \right)$
2,3	endwhile $ \left\{ \left(\begin{array}{c c} C_{TL} & C_{TR} \\ \hline C_{BL} & C_{BR} \end{array} \right) = \left(\begin{array}{c c} \widehat{C}_{TL} & \widehat{C}_{TR} \\ \hline \widehat{C}_{BL} & A_R^T A_R + \widehat{C}_{BR} \end{array} \right) \land \neg (m(C_{BR}) < m(C)) $
1b	$\left\{ C = A^T A + \widehat{C} \right\}$

Step	Algorithm: $[C] := \text{SYRK_LT_UNB_VAR2}(A, C)$
1a	${C = \widehat{C}}$
4	$C \to \begin{pmatrix} C_{TL} & C_{TR} \\ C_{BL} & C_{BR} \end{pmatrix}, A \to \begin{pmatrix} A_L & A_R \end{pmatrix}$ where C_{BR} is 0×0 , A_R has 0 columns
2	$\left\{ \left(\begin{array}{c c} C_{TL} & C_{TR} \\ \hline C_{BL} & C_{BR} \end{array} \right) = \left(\begin{array}{c c} \widehat{C}_{TL} & \widehat{C}_{TR} \\ \hline \widehat{C}_{BL} & A_R^T A_R + \widehat{C}_{BR} \end{array} \right)$
3	while $m(C_{BR}) < m(C)$ do
2,3	$\left\{ \begin{array}{c c} C_{TL} & C_{TR} \\ \hline C_{BL} & C_{BR} \end{array} \right) = \left(\begin{array}{c c} \widehat{C}_{TL} & \widehat{C}_{TR} \\ \hline \widehat{C}_{BL} & A_R^T A_R + \widehat{C}_{BR} \end{array} \right) \wedge m(C_{BR}) < m(C)$
5a	$ \begin{pmatrix} C_{TL} & C_{TR} \\ C_{BL} & C_{BR} \end{pmatrix} \rightarrow \begin{pmatrix} C_{00} & c_{01} & C_{02} \\ c_{10}^T & \gamma_{11} & c_{12}^T \\ \hline C_{20} & c_{21} & C_{22} \end{pmatrix}, \begin{pmatrix} A_L & A_R \end{pmatrix} \rightarrow \begin{pmatrix} A_0 & a_1 & A_2 \end{pmatrix} $ where γ_{11} is 1×1 , a_1 has 1 column
6	
8	
7	
5b	$ \left(\begin{array}{c c c} C_{TL} & C_{TR} \\ \hline C_{BL} & C_{BR} \end{array}\right) \leftarrow \left(\begin{array}{c c c} C_{00} & c_{01} & C_{02} \\ \hline c_{10}^T & \gamma_{11} & c_{12}^T \\ C_{20} & c_{21} & C_{22} \end{array}\right), \left(\begin{array}{c c c} A_L & A_R \end{array}\right) \leftarrow \left(\begin{array}{c c c} A_0 & a_1 & A_2 \end{array}\right) $
2	$\left\{ \begin{array}{c c} \left(\frac{C_{TL}}{C_{BL}} \left \frac{C_{TR}}{C_{BR}} \right) = \left(\frac{\widehat{C}_{TL}}{\widehat{C}_{BL}} \left \frac{\widehat{C}_{TR}}{\widehat{C}_{BL}} \right A_R^T A_R + \widehat{C}_{BR} \right) \right. \\ \end{array} \right\}$
	endwhile
2,3	$\left\{ \left(\begin{array}{c c} C_{TL} & C_{TR} \\ \hline C_{BL} & C_{BR} \end{array} \right) = \left(\begin{array}{c c} \widehat{C}_{TL} & \widehat{C}_{TR} \\ \hline \widehat{C}_{BL} & A_R^T A_R + \widehat{C}_{BR} \end{array} \right) \land \neg (m(C_{BR}) < m(C))$
1b	$\left\{ C = A^T A + \widehat{C} \right\}$

Step	Algorithm: $[C] := \text{SYRK_LT_UNB_VAR2}(A, C)$
1a	$\{C = \widehat{C}$
4	$C \to \left(\begin{array}{c c} C_{TL} & C_{TR} \\ \hline C_{BL} & C_{BR} \end{array}\right), A \to \left(\begin{array}{c c} A_L & A_R \end{array}\right)$ where C_{BR} is 0×0 , A_R has 0 columns
2	$ \left\{ \left(\frac{C_{TL}}{C_{BL}} \left \frac{C_{TR}}{C_{BR}} \right) = \left(\frac{\widehat{C}_{TL}}{\widehat{C}_{BL}} \left \frac{\widehat{C}_{TR}}{\widehat{C}_{BR}} \right) \right. \right\} $
3	while $m(C_{BR}) < m(C)$ do
2,3	$\left\{ \begin{array}{c c} C_{TL} & C_{TR} \\ \hline C_{BL} & C_{BR} \end{array} \right\} = \left(\begin{array}{c c} \widehat{C}_{TL} & \widehat{C}_{TR} \\ \hline \widehat{C}_{BL} & A_R^T A_R + \widehat{C}_{BR} \end{array} \right) \wedge m(C_{BR}) < m(C)$
5a	$ \left(\begin{array}{c c} C_{TL} & C_{TR} \\ \hline C_{BL} & C_{BR} \end{array}\right) \rightarrow \left(\begin{array}{c c} C_{00} & c_{01} & C_{02} \\ \hline c_{10}^T & \gamma_{11} & c_{12}^T \\ \hline C_{20} & c_{21} & C_{22} \end{array}\right), \left(\begin{array}{c c} A_L & A_R \end{array}\right) \rightarrow \left(\begin{array}{c c} A_0 & a_1 & A_2 \end{array}\right) $
6	$ \begin{cases} \frac{C_{00} \ c_{01}}{c_{10}} \ \begin{array}{c c} C_{02} \\ \hline C_{20} \ c_{21} \end{array} & C_{22} \end{cases} = \begin{pmatrix} \hat{C}_{00} \ \hat{c}_{01} \\ \hline \hat{C}_{10} \ \hat{c}_{11} \\ \hline \hat{C}_{20} \ \hat{c}_{21} \end{array} & \hat{C}_{22} \\ \hline \end{cases} = \begin{pmatrix} \hat{C}_{00} \ \hat{c}_{01} \\ \hline \hat{c}_{10}^T \ \hat{\gamma}_{11} \\ \hline \hat{C}_{20} \ \hat{c}_{21} \end{array} & \hat{C}_{12}^T \\ \hline \end{cases} = \begin{pmatrix} \hat{C}_{00} \ \hat{c}_{01} \\ \hline \hat{c}_{10}^T \ \hat{\gamma}_{11} \\ \hline \hat{C}_{20} \ \hat{c}_{21} \end{array} & \hat{C}_{12}^T \\ \hline \end{cases} $
8	
7	
5b	$ \left(\begin{array}{c c c} C_{TL} & C_{TR} \\ \hline C_{BL} & C_{BR} \end{array}\right) \leftarrow \left(\begin{array}{c c c} C_{00} & c_{01} & C_{02} \\ \hline c_{10}^T & \gamma_{11} & c_{12}^T \\ C_{20} & c_{21} & C_{22} \end{array}\right), \left(\begin{array}{c c c} A_L & A_R \end{array}\right) \leftarrow \left(\begin{array}{c c c} A_0 & a_1 & A_2 \end{array}\right) $
2	$ \left\{ \begin{array}{c c} C_{TL} & C_{TR} \\ \hline C_{BL} & C_{BR} \end{array} \right) = \left(\begin{array}{c c} \widehat{C}_{TL} & \widehat{C}_{TR} \\ \hline \widehat{C}_{BL} & A_R^T A_R + \widehat{C}_{BR} \end{array} \right) $
	endwhile
2,3	$\left\{ \left(\begin{array}{c c} C_{TL} & C_{TR} \\ \hline C_{BL} & C_{BR} \end{array} \right) = \left(\begin{array}{c c} \widehat{C}_{TL} & \widehat{C}_{TR} \\ \hline \widehat{C}_{BL} & A_R^T A_R + \widehat{C}_{BR} \end{array} \right) \land \neg (m(C_{BR}) < m(C))$
1b	$\left\{ C = A^T A + \widehat{C} \right\}$

Step	Algorithm: $[C] := \text{SYRK_LT_UNB_VAR2}(A, C)$
1a	$\{C = \widehat{C}$
4	$C \to \left(\begin{array}{c c} C_{TL} & C_{TR} \\ \hline C_{BL} & C_{BR} \end{array}\right), A \to \left(\begin{array}{c c} A_L & A_R \end{array}\right)$ where C_{BR} is 0×0 , A_R has 0 columns
2	$ \left\{ \left(\frac{C_{TL}}{C_{BL}} \left \frac{C_{TR}}{C_{BR}} \right) = \left(\frac{\widehat{C}_{TL}}{\widehat{C}_{BL}} \left \frac{\widehat{C}_{TR}}{\widehat{C}_{BR}} \right) \right. \right\} $
3	while $m(C_{BR}) < m(C)$ do
2,3	$\left\{ \begin{array}{c c} C_{TL} & C_{TR} \\ \hline C_{BL} & C_{BR} \end{array} \right\} = \left(\begin{array}{c c} \widehat{C}_{TL} & \widehat{C}_{TR} \\ \hline \widehat{C}_{BL} & A_R^T A_R + \widehat{C}_{BR} \end{array} \right) \wedge m(C_{BR}) < m(C)$
5a	$ \left(\begin{array}{c c c} C_{TL} & C_{TR} \\ \hline C_{BL} & C_{BR} \end{array}\right) \to \left(\begin{array}{c c c} C_{00} & c_{01} & C_{02} \\ \hline c_{10}^T & \gamma_{11} & c_{12}^T \\ \hline C_{20} & c_{21} & C_{22} \end{array}\right), \left(\begin{array}{c c c} A_L & A_R \end{array}\right) \to \left(\begin{array}{c c c} A_0 & a_1 & A_2 \end{array}\right) $ where C_{CR} is 1 × 1, C_{CR} has 1 solumn.
6	$ \begin{cases} \frac{C_{00} \ c_{01}}{C_{00}} \ c_{01} \ c_{02} \\ \frac{c_{10}^T \ \gamma_{11}}{C_{20} \ c_{21}} \ c_{22} \end{cases} = \begin{pmatrix} \hat{C}_{00} \ \hat{c}_{01} \ \hat{C}_{02} \\ \hat{c}_{10}^T \ \hat{\gamma}_{11} \ \hat{c}_{12}^T \\ \hat{C}_{20} \ \hat{c}_{21} \ A_2^T A_2 + \hat{C}_{22} \end{pmatrix} $
8	
7	$ \begin{cases} \begin{pmatrix} C_{00} & c_{01} & C_{02} \\ c_{10}^T & \gamma_{11} & c_{12}^T \\ C_{20} & c_{21} & C_{22} \end{pmatrix} = \begin{pmatrix} C_{00} & c_{01} & C_{02} \\ c_{10}^T & a_1^T a_1 + \widehat{\gamma}_{11} & a_1^T A_2 + \widehat{c}_{21}^T \\ C_{20} & A_2^T a_1 + \widehat{c}_{21} & A_2^T A_2 + \widehat{C}_{22} \end{pmatrix} $
5b	$ \left(\begin{array}{c c c} C_{TL} & C_{TR} \\ \hline C_{BL} & C_{BR} \end{array}\right) \leftarrow \left(\begin{array}{c c c} C_{00} & c_{01} & C_{02} \\ \hline c_{10}^T & \gamma_{11} & c_{12}^T \\ C_{20} & c_{21} & C_{22} \end{array}\right), \left(\begin{array}{c c c} A_L & A_R \end{array}\right) \leftarrow \left(\begin{array}{c c c} A_0 & a_1 & A_2 \end{array}\right) $
2	$ \left\{ \begin{array}{c c} C_{TL} & C_{TR} \\ \hline C_{BL} & C_{BR} \end{array} \right) = \left(\begin{array}{c c} \widehat{C}_{TL} & \widehat{C}_{TR} \\ \hline \widehat{C}_{BL} & A_R^T A_R + \widehat{C}_{BR} \end{array} \right) $
	endwhile
2,3	$\left\{ \left(\begin{array}{c c} C_{TL} & C_{TR} \\ \hline C_{BL} & C_{BR} \end{array} \right) = \left(\begin{array}{c c} \widehat{C}_{TL} & \widehat{C}_{TR} \\ \hline \widehat{C}_{BL} & A_R^T A_R + \widehat{C}_{BR} \end{array} \right) \land \neg (m(C_{BR}) < m(C))$
1b	$\{C = A^T A + \widehat{C} $

Step	Algorithm: $[C] := \text{SYRK_LT_UNB_VAR2}(A, C)$
1a	$\{C = \widehat{C}$
4	$C \to \left(\begin{array}{c c} C_{TL} & C_{TR} \\ \hline C_{BL} & C_{BR} \end{array}\right), A \to \left(\begin{array}{c c} A_L & A_R \end{array}\right)$ where C_{BR} is 0×0 , A_R has 0 columns
2	$ \left\{ \left(\frac{C_{TL}}{C_{BL}} \left \frac{C_{TR}}{C_{BR}} \right) = \left(\frac{\widehat{C}_{TL}}{\widehat{C}_{BL}} \left \frac{\widehat{C}_{TR}}{\widehat{C}_{BR}} \right) \right. \right\} $
3	while $m(C_{BR}) < m(C)$ do
2,3	$\left\{ \begin{array}{c c} C_{TL} & C_{TR} \\ \hline C_{BL} & C_{BR} \end{array} \right\} = \left(\begin{array}{c c} \widehat{C}_{TL} & \widehat{C}_{TR} \\ \hline \widehat{C}_{BL} & A_R^T A_R + \widehat{C}_{BR} \end{array} \right) \wedge m(C_{BR}) < m(C)$
5a	$ \left(\begin{array}{c c c} C_{TL} & C_{TR} \\ \hline C_{BL} & C_{BR} \end{array}\right) \to \left(\begin{array}{c c c} C_{00} & c_{01} & C_{02} \\ c_{10}^T & \gamma_{11} & c_{12}^T \\ \hline C_{20} & c_{21} & C_{22} \end{array}\right), \left(\begin{array}{c c c} A_L & A_R \end{array}\right) \to \left(\begin{array}{c c c} A_0 & a_1 & A_2 \end{array}\right) $
6	$ \begin{cases} \frac{C_{00} \ c_{01}}{C_{10} \ \gamma_{11}} \ \text{is } 1 \times 1, \ a_{1} \ \text{has } 1 \ \text{column} \\ \frac{C_{00} \ c_{01}}{C_{10} \ \gamma_{11}} \ c_{12}^{T} \\ \frac{C_{10} \ \gamma_{11}}{C_{20} \ c_{21}} \ C_{22} \end{cases} = \begin{pmatrix} \hat{C}_{00} \ \hat{c}_{01} & \hat{C}_{02} \\ \hat{c}_{10}^{T} \ \hat{\gamma}_{11} & \hat{c}_{12}^{T} \\ \hat{C}_{20} \ \hat{c}_{21} \ A_{2}^{T} A_{2} + \hat{C}_{22} \end{pmatrix} $
8	$ \gamma_{11} := a_1^T a_1 + \gamma_{11} c_{21} := A_2^T a_1 + c_{21} $
7	$ \left\{ \begin{array}{c cc} C_{00} & c_{01} & C_{02} \\ \hline c_{10}^T & \gamma_{11} & c_{12}^T \\ C_{20} & c_{21} & C_{22} \end{array} \right\} = \left(\begin{array}{c cc} C_{00} & c_{01} & C_{02} \\ \hline c_{10}^T & a_1^T a_1 + \widehat{\gamma}_{11} & a_1^T A_2 + \widehat{c}_{21}^T \\ C_{20} & A_2^T a_1 + \widehat{c}_{21} & A_2^T A_2 + \widehat{C}_{22} \end{array} \right) $
5b	$ \left(\begin{array}{c c c} C_{TL} & C_{TR} \\ \hline C_{BL} & C_{BR} \end{array}\right) \leftarrow \left(\begin{array}{c c c} C_{00} & c_{01} & C_{02} \\ \hline c_{10}^T & \gamma_{11} & c_{12}^T \\ C_{20} & c_{21} & C_{22} \end{array}\right), \left(\begin{array}{c c c} A_L & A_R \end{array}\right) \leftarrow \left(\begin{array}{c c c} A_0 & a_1 & A_2 \end{array}\right) $
2	$\left\{ \begin{array}{c c} C_{TL} & C_{TR} \\ \hline C_{BL} & C_{BR} \end{array} \right) = \left(\begin{array}{c c} \widehat{C}_{TL} & \widehat{C}_{TR} \\ \hline \widehat{C}_{BL} & A_R^T A_R + \widehat{C}_{BR} \end{array} \right)$
	endwhile
2,3	$\left\{ \left(\begin{array}{c c} C_{TL} & C_{TR} \\ \hline C_{BL} & C_{BR} \end{array} \right) = \left(\begin{array}{c c} \widehat{C}_{TL} & \widehat{C}_{TR} \\ \hline \widehat{C}_{BL} & A_R^T A_R + \widehat{C}_{BR} \end{array} \right) \land \neg (m(C_{BR}) < m(C))$
1b	$\{C = A^T A + \widehat{C} $

Algorithm: $[C] := \text{SYRK_LT_UNB_VAR2}(A, C)$
$C \to \left(\begin{array}{c c} C_{TL} & C_{TR} \\ \hline C_{BL} & C_{BR} \end{array}\right), A \to \left(\begin{array}{c c} A_L & A_R \end{array}\right)$ where C_{BR} is 0×0 , A_R has 0 columns
while $m(C_{BR}) < m(C)$ do
$ \begin{pmatrix} C_{TL} & C_{TR} \\ C_{BL} & C_{BR} \end{pmatrix} \to \begin{pmatrix} C_{00} & c_{01} & C_{02} \\ c_{10}^T & \gamma_{11} & c_{12}^T \\ C_{20} & c_{21} & C_{22} \end{pmatrix}, \begin{pmatrix} A_L & A_R \end{pmatrix} \to \begin{pmatrix} A_0 & a_1 & A_2 \end{pmatrix} $ where γ_{11} is 1×1 , a_1 has 1 column
$ \gamma_{11} := a_1^T a_1 + \gamma_{11} $ $ c_{21} := A_2^T a_1 + c_{21} $
$ \left(\begin{array}{c c c} C_{TL} & C_{TR} \\ \hline C_{BL} & C_{BR} \end{array}\right) \leftarrow \left(\begin{array}{c c c} C_{00} & c_{01} & C_{02} \\ \hline c_{10}^T & \gamma_{11} & c_{12}^T \\ C_{20} & c_{21} & C_{22} \end{array}\right), \left(\begin{array}{c c c} A_L & A_R \end{array}\right) \leftarrow \left(\begin{array}{c c c} A_0 & a_1 & A_2 \end{array}\right) $
endwhile

Algorithm: $[C] := SYRK_LT_UNB_VAR2(A, C)$

$$C \to \left(\begin{array}{c|c} C_{TL} & C_{TR} \\ \hline C_{BL} & C_{BR} \end{array}\right) , A \to \left(\begin{array}{c|c} A_L & A_R \end{array}\right)$$

where C_{BR} is 0×0 , A_R has 0 columns

while $m(C_{BR}) < m(C)$ do

$$\left(\begin{array}{c|c|c} C_{TL} & C_{TR} \\ \hline C_{BL} & C_{BR} \end{array}\right) \to \left(\begin{array}{c|c|c} C_{00} & c_{01} & C_{02} \\ \hline c_{10}^T & \gamma_{11} & c_{12}^T \\ \hline C_{20} & c_{21} & C_{22} \end{array}\right) , \left(\begin{array}{c|c|c} A_L & A_R \end{array}\right) \to \left(\begin{array}{c|c|c} A_0 & a_1 & A_2 \end{array}\right)$$

where γ_{11} is 1×1 , a_1 has 1 column

$$\gamma_{11} := a_1^T a_1 + \gamma_{11}$$

$$c_{21} := A_2^T a_1 + c_{21}$$

$$\left(\begin{array}{c|c|c} C_{TL} & C_{TR} \\ \hline C_{BL} & C_{BR} \end{array}\right) \leftarrow \left(\begin{array}{c|c|c} C_{00} & c_{01} & C_{02} \\ \hline c_{10}^T & \gamma_{11} & c_{12}^T \\ C_{20} & c_{21} & C_{22} \end{array}\right), \left(\begin{array}{c|c|c} A_L & A_R \end{array}\right) \leftarrow \left(\begin{array}{c|c|c} A_0 & a_1 & A_2 \end{array}\right)$$

endwhile